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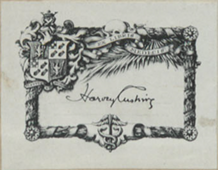
ANATOMY

By Dr. Hunter.

Mr. W. Mercer



Dr Hunter's Anatomical Lectures

1775 & 1776

Anatomical & Chirurgical
Lectures

Read by Dr William Hunter
& Mr William Cruikshank
(on Dissected Bodies)
at their Theatre in
Windmill Street, Hay market
London

Taken in Writing by
William Tempest Mercer
A Pupil attending the said Lectures, in
1775 & 1776

Contents

Lect		Page
1	Introduction	1
2	Structure of the Body	9
3	The Blood	15
4	Vascular System	23
5	Arteries & Veins	31
6	Absorbing System	39
7	Glandular System	48
8	Nervous System	54
9	Cellular Membrane	62
10	Muscular System	70
11	Ditto Continued	76
12	The Bones	81
13	Bones, Joints & Cartilages	88
14	Ligaments, Luxations & Synovia	94
15	Formation of Bones	100
16	Bones of the Trunk	106
17	Ditto Continued	111
18	Ditto Continued	117
19	Ditto & Upper Extremity	123
20	Bones of Upper & Lower Extremity	129
21	Lower Extremity Continued	134
22	Bones of the Head in General	139
23	Ditto Continued	145

Contents

Lect		Page
24	Bones of the Head Continued	151
25	The Teeth	161
26	Diseases of the Bones	170
27	Abdominal Muscles	180
28	Male Organs of Generation	184
29	Ditto Continued	190
30	Contents of the Pelvis, & Male Organs of Generation	198
31	Male Organs Continued	204
32	Ditto, & Diseases of the Bones	212
33	Cutis, Cuticula, Rete Mucosum, Nails & Hair	219
34	Insensible Perspiration, & Calculous Concretions	227
35	Particular Muscles, the Head, Face &c	232
36	Muscles of the Neck, Breast &c	235
37	Muscles of the Back &c	237
38	The Pharynx, Palatum, Fauces, Heart, Diaphragm & Broad muscle	238
39	Psoas Parvus, Fascia of the Thigh, & Causes of Mischief in Bleeding	242
40	Particular Muscles, & Vessels	244
41	Muscles of the Leg and Foot	246
42	Muscles of the Arm & Fore Arm, Fascia of the Arm & Hand, Capsular Ligament of the Shoulder, Observations on Fractures, & On the Living Principle of the Blood &c	247

Contents

Lect		Page
43	Muscles & Tendons of Fingers, Joints &c	252
44	The Viscera, Abdomen Thorax, Pleura, Mediastinum, Lungs, Heart, Pericardium, & Peritonaeum	257
45	Thorax, Duct, Trachea Arteria, Oesophagus, Diaphragm, Liver, Spleen, Mesentery & Intestines	265
46	Liver, Duodenum, Pancreas, Venæ Portarum, and abdominal Viscera	270
47	Stomach & Intestines	275
48	Spleen, Pancreas, & Liver	279
49	Female Organs of Generation	282
50	Ditto Continued	288
51	Lymphatics	294
52	Kidnies, & Glandulæ Renales	300
53	Alimentary Tube, Liver, Pancreas & Spleen	306
54	Diseases of the Alimentary Tube	311
55	Ditto Continued	318
56	Breast & Lungs	322
57	Use of the Lungs	328
58	Diseases of the Lungs; & the Heart	333
59	Circulation of the Blood	338
60	Ditto, & Diseases of the Spleen, Pancreas & Liver	342
61	The Arteries	346

The first one of these Lectures is essentially an abbreviated form of the same as that which Hunter "left corrected for the Press" to be published in 1784 the year in which the last course was given.

Two Introductory Lectures / delivered by / Dr William Hunter / to his last course of / Anatomical Lectures / at his / Theatre in Windmill-Street

Contents

Lect		Page
62	The Arteries Continued	348
63	Ditto Continued	351
64	Ditto, & Veins	353
65	The Brain	357
66	Ditto Continued	362
67	The Eye	364
68	Ditto Continued	367
69	Ditto Continued	371
70	Mouth & Nose	375
71	Mouth, Throat &c	379
72	Throat & Ear	383
73	The Ear	387
74	Introduction to Chirurgical Operations	390
75	On Sutures	393
76	On Dropsy	396
77	On Hernia	402
78	On Ditto & Hydrocele	408
79	Diseases of the Testicles, & Urinary Complaints	414
80	Empyema, & Amputation of the Breast	422
81	On Embalming	428
82	On Lithotomy	429
83	Amputation of the Penis, Fistula in Ano, Bronchotomy, & Wry Neck	434
84	Extirpation of Tonsils & Uvula, Tongue tied, Hare Lip & Polypus	437
85	Fistula Lachrymalis, Cataract, & Trepanning	442

Contents

Lect		Page
86	Aneurisms	448
87	Amputation	452
88	Ditto Continued	456
89	Gravid Uterus	461
90	Ditto Continued	465
91	Ditto Continued	471
92	The Fœtus	477
93	Secundines, Menstruation, Impregnation & Conception, Monsters, Flooding, & Retroversion of the Uterus	483
94	Fœtus in Utero, & Diseases of Women	490
95	Pregnancy, Retroversion of the Uterus & Labour	497
96	Labour Continued	502
97	Ditto Continued	508
98	Treatment after the Birth of Mother & Child	514
99	On Embalming, being a Supplement to 81st Lecture	517

Lect 1st

Introduction

Anatomy is the Art of Examining Human bodies by Dissection

The Advantages we recieve from it are very great, the principal of which is that it teaches us a rational method of curing Diseases; The Word Anatomy is derived from the Greek, and strictly speaking signifies cutting, but in it's most general Acceptation is less confined & signifying any thing done with a View to discover the Structure & Organization of Animals, comprehending in this Sense, Maceration, Injection, Corrosion, Distillation, Boiling Preservation &c &c. and is extended to every part of the body. Anatomy is divided into Human & Comparative. The first respects only the Human Species, the latter includes all other Animals whatever. The first, or Human anatomy is what we profess to teach, intending only to introduce occasionally just so much of the Second as may be necessary to illustrate & more readily Explain the first. The Structure of the Body is in many parts so extremely delicate & fine, as to remain yet undiscovered, in Others it is more apparent, and comes under our Inspection. From the Dissection of Brutes the Ancients gained all the Anatomical Knowledge they were possessed of. No Wonder therefore that we find their descriptions of the Human frame so erroneous and incorrect, & so greatly inferior to those of the Moderns, who have such frequent Opportunities of having recourse to Human bodies to solve their Difficulties. This as well as most of the Arts has undergone many Revolutions, at one time it has been held in the highest Veneration & cultivated by Men of Eminence, at another it has been despised, and neglected. As to it's Origin we are still in the dark. Like Others perhaps it had no precise Beginning, the common Accidents of Life awakening now & then an Attention in Mind to the Consideration of this Subject, so that it is very probable, the first Man might have attained some knowledge of the External Form,

and even

Introduction

and even a small degree of the Internal — this rude knowledge gradually improving from Men's having Observed the Alterations in Bodies by all kinds of Violence; Funeral Ceremonies & such like at last grew into a System. It must have received great Assistance from the Ceremonies used at Sacrifices; he whose business it was to perform those Rites, could not but find something to engage the Attention, & to excite Reflection — the Priest, the Augur, but above all the Butcher must have acquired some Idea of the Animal Machine, their Occupations leading them often to the inspection of Brutes — the finding of Brutes similar in many Respects to Mankind, & they being easily procured, induced Men more frequently to examine into their Texture, by which means a gradual insight was gained into the Animal Oeconomy, & Anatomy became a Branch of Learning. The Greeks are the first People we have any Authentic of, who studied it as an Art: it is probable that they first derived their knowledge from the Eastern Nations, particularly the Ethiopians & Aegyptians, from its being so closely connected with Astronomy in its Infancy — The Aegyptians, & other Eastern Nations from the Situation of their Country, the clearness of the Sky the greatest part of the year, & from their Custom of Sleeping on the House top with no other Canopy than the Heavens, could not fail of making many Observations on the Motions of the Heavenly bodies, & from the great influence those Motions were supposed to have on the Human Body, it is highly probable that they studied Anatomy likewise; however that be, Thales, sirnamed the Wise, is the first Anatomist we have any account of, & this was 580 years before Christ, — no Progress was made in the Art till the time of Hippocrates, who was Cotemporary with Socrates, Xenophon, & Plato 400 years before the Christian Aera — He divided Anatomy & Medicine from the other Arts & made it a distinct Study. He is the first Author we have any account of, who wrote on Anatomy —

He informs

The Introduction

He informs us, he had never an Opportunity of inspecting the Human body, & but once saw an human Skeleton — The first Dissection we have on Record was made by Democrates of Abdera, who had for his Subject a Hog — From Hippocrates the Art gradually increased till the time of Galen, who lived in the second Century (that is 600 years after Hippocrates) during this Interval several great men appeared, who contributed much to its advancement, particularly Aristotle, who lived about one hundred years after Hippocrates — He raised Philosophy in general to a very high pitch, but was a greater Physiologist than Philosopher — And also Herophilus and Aristratus (about 251 years before Christ) of Alexandria, where the Greeks went to finish their Education — Here most probably the first Human dissections were made — Galen applied himself diligently to Anatomy, studied in Asia Minor, & then went into Alexandria — He composed many Books, which for the time he lived in, are certainly a very great performance, but his Dissections were chiefly confined to Quadrupeds, opportunities of dissecting human Subjects from the Superstition of the times being very rare — For a long Series of years after Galen the Art declined, & so indeed did Arts in general, decaying as the Empire of Rome decayed — Galen had acquired so great a Character as an Anatomist, that his Successors, probably despairing of going beyond so great a man, contented themselves with explaining his Doctrines — Then in the fifth Century Learning of every kind received a severe Shock from the Eruption of the Barbarous Goths, & Vandals, who overran all the Western Empire, & destroyed whatever traces of the Arts they could find; which Obliged men of Learning & others to fly to Greece to avoid their Fury — But in the middle of the seventh Century it received almost a total Overthrow from the Saracens who spread their Devastations over the East, surpassing the former in

Cruelty —

Introduction

Cruelty and Contempt of Letters — Among other places which suffered from their Violence was Alexandria, which has been the seat of Learning for 900 Years, where the finest Library then in the World was burnt. In less than 100 Years after the appearance of Mahomet, they had conquered all Asia minor, & Africa; & about the Year 717 came to the Eastern part of Europe; here they laid Siege to Constantinople, the only place where the Arts survived, but happily were repulsed — Under the Government of the Caliphs, Physic & Anatomy were on a very indifferent footing, but Abdallah, who lived about the Year 749 protected learned men, & invited them to Court, particularly the Arabians, who had learnt their Art of the Greeks, & from the Arabs the western part of Europe gained all their knowledge, Spain being conquered & possessed by them — The Arts, which had been almost extinguished by the Irruptions of the Goths & Saracens, in the latter part of the thirteenth Century began to dawn in Europe, particularly in Italy, where Mundeen in the year 1315 published & explained whatever was left of Galen, which publication was by a Public Decree pronounced to be the Standard of Medicine, and was read in all the Schools throughout Italy for 200 years. — In the fifteenth Century the Descendants of the Saracens, the Turks took Constantinople, and committed the same Outrages their Predecessors had done — The Greeks fled from their Barbarity to Italy, which was at this time disposed to receive them a Desire of Literature having arisen among them — thus it came about, that the Italians were the first, that made advances to restore Learning, soon after which the Useful Art of Painting was invented — The Portuguese found out the Passage to the Cape of Good Hope, and in the fifteenth Century Columbus discovered America, so that many circumstances arose nearly at the same time to excite Men to cultivate the Arts: And indeed the Monuments of Ancient knowledge with which Italy every where abounded, must have contributed in a great degree,

great degree to excite this flame: One reason why the Jews & Mahometans made no progress was, that Anatomy was their superstitious Doctrine of Cleanness & Uncleanness, & therefore they were averse to the handling of dead bodies ~ About this time (in the 15th Century) the famous Leonardo de Vinci, who was the first man, that made any Anatomical Drawings, published a Treatise with Anatomical Plates, & Explanations, the Figures were drawn with red Chalk touched with a Pen, & the Explanations are written with the left hand backwards, so that it is necessary to make use of a Looking-Glass to read them ~ This Book is now preserved in his Majesty's Library, & Testimonies are given by Authors, which render its authenticity indubitable ~ Vasari in his Lives of the Painters, says that Leonardo composed for his own Amusement Drawings of the Anatomy of an Horse; & from the Excellency of his figures, and Delineations we may conclude him to have been an excellent Anatomist ~ Antonio de Lacusa, read Lectures at Padua, & was the first Anatomical Lecturer we know of, he explained Galen, & taught Physic ~ Morgagni & others taught Anatomy, & made some few Discoveries, but till the time of Vesalius, they did little more than copy Galen ~ In 1540 Vesalius appeared, he was at Brussels in 1514, from Brussels he went to Paris, & was under Silvius: here he remained 8 years, & was uncommonly studious, often stealing Limbs, & sometimes whole Bodies from the Gallows: At the Age of 28 he published a System of Anatomy illustrated with many noble figures, in which he dissented from the common Errors adopted from Galen by Silvius ~ He was afterwards under Fernelius & Andronicus, when he now & then had opportunities of dissecting a human Subject; afterwards he returned to Louvain, where he taught Anatomy ~ He was publickly invited to Padua by the Magistrates to teach Anatomy & Physic ~ He taught also at Bologna, & Pisa by turns, making One Course to last about three Weeks ~ He was well supplied with bodies by the publick Order from the Executions ~

He went

Introduction

He went afterwards to the Court of Charles the fifth, but not being so well rece:
:ived by the Emperor as he thought he merited, he withdrew himself & in a
Pet burnt all his papers. His dissenting from Galen in many things raised
him many Enemies, particularly Silvius, Columbus, Fallopius, Eustachius,
& others, with these he held great disputes, but in the Course of these controversies
falling into the same fault of which he had accused Galen (giving descriptions
of parts of the human body from those of Brutes) he came into disgrace for
in Spain he had no Opportunities of dissecting human Subjects. He lost his
Life as he was making a pilgrimage to the Holy Land. From his time the
arts have been improving. In the year 1600 Harvey, as was customary
then, went to study Anatomy in Italy. His master Fabricius ab Aquapendente
having discovered the Valves in the Veins, published his doctrine of the Veins
carrying the Blood from the Heart to the Liver. this was sufficient for
Harvey's Genius to work upon, & from Experience he found out the Circulation
of the Blood in 1616, but did not publish it till 1628. Harvey's Doctrine
at first met with considerable Opposition from the Favourers of Galen's
System. The next thing that naturally presented itself for enquiry was
the passage of the Nutriment into the Blood. In 1627 Assellius discovered
the Lacteals, and in 1651 Pequet dissecting a Dog to observe the Lacteals,
discovered the Thoracic Duct & Receptaculum Chyli. In 1652 Rudbeck, a
Swede, and Bartholine discovered the Lymphatics. When these things were
known, it was natural enough to enquire, whether nature observed the
same Oeconomy in the Foetus as in the Adult. On this Subject Harvey
published some valuable books, and about this time some Dutch Anato:
:mists, viz Swammerdam, Van Horne, Steno, & De Graaf made a great
noise in their Writings, in which they endeavoured to prove that Vivi:
:parous Animals are produced from Eggs as well as Oviparous ones.

Malpighius

Malpighius by the help of Magnifying Glasses discovered parts, which be:
:fore had escaped the minutest inspection: He was seconded by Lewenhoeck
who discovered the Globules of the blood, & carried his researches so far, as to
affirm that he saw that the communication of the Arteries & the Veins, and
that there were an infinite Number of Animalcula in the Male Semen. Towards
the latter end of the last Century, Injections, & other Anatomical Preparations
were made under Swammerdam & Ruysch in Holland; and Cowper & St Andree
in England. Dr Nicholls was the first that used the process of Corrosion, by
which the Vascular Structure of many parts is made evident by first injec:
:ting with Wax. The Figures & Models made of Wax are in general very
inaccurate, but those made of Plaister & Lead from the parts themselves are
very good & serviceable. Cheselden, Albinus, and Others have given us
several exact figures of the different parts of the Human body which have helped
to improve the Art. Among the discoveries of the present Age Dr Hunter
mentions those which he has been fortunate enough to make himself, and
which he thinks the greatest since the discovery of the Circulation of the
Blood; Viz. that the Lymphatics or Absorbing Vessels are the same as the
Lacteals, which with the Receptaculum Chyli & Thoracic Duct form one
System for Absorption: that in the Gravid Uterus the internal Membrane
of the Womb composes the external One of the Secundines, and with them is
thrown off from the Uterus every time a Woman brings forth a Child or mis:
:carries, being reproduced, and called Decidua, and that therefore the Placenta
is partly made of an Excrescence, or Efflorence from the Uterus itself.
Mr John Hunter discovered the Lacteals in birds, & Mr Hewson those in Fishes.
A moments reflection will prove, that tho' great Studies have been made
towards perfection, yet the Subject is far from being exhausted, and were our

Senses

Introduction

Senses more acute, we should find that What we now know, compared with what is still unknown, would bear but a small proportion — Astronomy and Anatomy present us with the most striking Views of the Omnipotence & wisdom of the Creator: It is indispensably necessary for a man who practises Surgery or Physic to be well acquainted with this study, it teaches him where to cut with Safety, and Dispatch, and enables him to form a just prognostic of Diseases. In short Anatomy is the Basis of Surgery, it informs the Head, guides the Hand, and familiarises the Heart with a kind of necessary inhumanity in the Use of cutting Instruments — The Anatomist, who can calmly consider the Structure of the Human Body without having the noblest Thoughts arising in his mind of it's Divine author (if there is such a man I say) he must certainly have his Soul labouring under a dead Palsy, as the great Milton could look on the Sun at mid-day without seeing it's Light from a defect in his Optic nerves.

The Structure of the Human Body in General

Lecture 2d

Having taken a short View of the Rise & Progress of Anatomy, we shall now proceed to give some Account of the different Methods of teaching it, but must first make some Observations on the Structure of the Human body in general. When we take a View of the great Number of different parts, of which the body is composed, & their dependance on each Other, it appears to be such a Complex Machine, that instead of being surprized at the prodigious Number of diseases to which it is liable, it is really admirable that every part performs its Office with such Exactness & regularity. A Moment's reflection will convince us, that the Animal Fabric, tho' Complex is only necessarily so. Let us suppose it granted to a Man to Model a Being like himself, but if possible with less imperfections, how would he go about the work? First, he has an Intellectual Mind given him to place in this Body, she must be provided with a proper residence, the Brain we will say is for this, where she may hold her Empire. As this Mind is to hold an Intercourse with the Body, to be a faithful Monitor to it, & to direct its Motions, it must have Servants for these purposes, of course it must have Nerves to give a power of Motion, to enable it to pursue whatever objects are pleasing, & to avoid what are displeasing. Muscles & Tendons must be provided, different bones are wanting to support the Fabrick, & not one continued bone, which would make the body stiff & rigid. The Ligaments serve to bind, & keep the bones in their places, and that the Ends of these may be the More free & easy upon each Other, they must be furnished with smooth Cartilages & Mucus, to fill up the intermediate spaces we add the Cellular Membrane, & as a case or covering to the Whole, the Skin, which is also

is also the Organ of feeling. As this body is to live in Society, & hold an intercourse with the beings around it, it must have the Organs of Speech, & the Organs of Speech require the Organs of hearing. The Organs of Sight are absolutely necessary on a thousand occasions. Thus far then nothing appears superfluous. But the Machine is not yet compleat. It is the nature of Matter to act on Matter, & if the body was not continually recruited it would be soon worn out; therefore that fine Balsamic fluid the Blood must be provided to repair the Machine, to wash away the Old Materials which are become useless, & to carry them to the several Emunctories of the body, viz the various Glands thro which the noxious, or useless particles are strained from the blood, & carried out of the body. That the Blood may perform these Offices it is necessary it should circulate thro every, even the most minute part of the body. And thus we see, we perceive the Advanta:
:ges arising from the Heart, the Arterial & Venal Systems. The Blood itself from performing these Offices, would soon be expended, were it not continually recruited. This must be done by Food. The Earth abounds with Animal & Vegetable Substances proper for these purposes, & Man is provided with most useful instruments, the hands, to procure Subsistance. Food in its crude State is very different from Blood, into which it is to be changed, which makes the Teeth, Stomach, & in short all the Organs Subservient to Digestion necessary, as also the Senses of Smelling & Tasting, that we may be able to choose proper food. The finer & more subtle parts of this prepared mass being what is proper for the formation of Blood, is absorbed by the Lacteals in the Intestines, and conveyed into the Blood Vessels, while the grosser and useless part is carried thro the Intestinal Canal out of the Body. Now this Body like all limited Ones, has its duration, it is nourished, grows,

arises

The Structure of the Human Body in General

arises at its perfection, decays & falls to Dust — That the Species should be preserved; it is necessary that it should have the power of multiplying its kind — Thus we see there are several different Systems in the body; the Vascular System for nutrition, the Nerves for Sensation, the Ligaments for Union, the Bones for Strength, the Muscles & Tendons for Motion, the Organs of digestion for supplying the Nutriment, & the Organs of Generation for the propagation of the Species: After taking this View of the constituent parts of the Human body, there still remains the Organs of Respiration, which we cannot account for a Priori: that they are essentially necessary to Life we well know — And we should lament our ignorance that we cannot perceive their Mode of Acting as readily as of some Other Organs, yet when we reflect upon the wonderful contrivances exhib:ited in the human frame, the infinite wisdom shewn in the putting toge:ther the several parts of it, each part having a power lodged in it to a certain degree of restoring itself when injured, to wit, a Wound heals of itself, a broken bone unites & forms a Callus, dead parts seperate from the living, when there is a redundancy of Blood an hæmorrhage ensues, & when a proper quantity is evacuated the Vessels close again by their own Elasticity, together with the wonderful Mystery of Generation, we shall readily acknowledge our Frame to be the Work of an Infinite Wise and Good Being ——

There are two Ways of teaching Anatomy, Analytically & Synthetically — The first, or Analytic signifies Resolution or the taking to pieces the seve:ral parts, beginning with those which form the principal parts, and ending with the smaller — the second or Synthetic is just the reverse beginning with the more Simple, and ending with the more Compound: The first method is supposed to be the best adapted to the purpose of

investigation

investigation, and making discoveries. The latter has been persu'd in teaching Anatomy, and many Treatises have been composed on this Plan, but as sometimes the One, and sometimes the Other is best suited to explain the different parts, during the Course of the Lectures both will be made use of. This Branch of knowledge has been divided into two parts; the first pro:perly called Anatomy relates only to the matter, and Structure of the body, the second call'd Physiology and Animal Oeconomy comprehends the internal operations, and functions depending on Life. The body is made up of solid and fluid parts, is therefore divided into Solids & Fluids, & these again subdivided. The Solids are divided into two Classes, first the harder parts, or the Bones, called Osteology; secondly the softer, or fleshy parts call'd Sarcology. Osteology includes the Bones only, but Sarcology is divided into many other parts. First, Angiology, or Doctrine of the Vessels; Secondly Adelogy, or Doctrine of the Glands; Thirdly Neurology, or Doctrine of the Nerves; Fourthly Myology, or Doctrine of the Muscles; Fifthly, Splanch:nology, or Doctrine of the Viscera. Besides the Organs of the Senses, Generation and Integuments there still remain three Species of Solids, which cannot be properly placed in the Classes abovementioned, viz. the Hair, Nails, and Cartilages; the Cartilages are commonly classed with the Bones, as being appendages to them. The Hair & Nails with the Integuments for the same reason. The Ancients divided the Body into Similar, and Dissimilar parts; of the first Class were the Bones, Muscles, Blood Vessels, & such like; the dissimilar parts were such as a Finger, an Eye &c. This Method the Moderns have rejected. Another Absolute Division of the Body was into Sanguineous, and Spermatic parts. Muscles & other parts which were

said

of a red colour were called Sanguineous; Tendons & other parts, which were not of a red Colour but pale, were called Spermatic — The Fluids may be divided into three kinds: first the Crude Fluids or the Chyle, and what is absorbed from the Surface of the body; secondly, the general and perfect Fluid the Blood; Thirdly, the Local, or Secreted, viz: all secretions whatever, particular ones to particular parts of the body, some useful and retained, Others Useless and expelled. — It has been a Dispute whether Fluids are a proper Object for Anatomical Enquiry — they appear to be equally so with the Solids, they are both Objects of our Senses, and necessary to be understood — Describing and Demonstrating every part with Care will certainly teach Students more solid knowledge, than perplexing their Minds with numerous distinctions — Fresh Subjects are very necessary to any One Studying Anatomy, and so also are Preparations — Preparations serve two purposes, they enable us to keep for a long time uncommon and curious things, as the Gravid Uterus for Example, (and by these we can preserve from putrefaction the fine Minute parts of the body; there are two Methods used for the making of Preparations, the Wet, and the Dry — Both these kinds have their Advantages & disadvantages being changed in some Measure from their Natural State — the Wet lose their colour, and from the Astringency of the Liquor in which they are contain'd their form in some degree is Altered — the Dry change their Appearance greatly — the Muscles for Example, from being flexid and pliable, become black, and rigid: Bones indeed retain their natural form — So much for the Anatomical or first part, into which the Study of Anatomy is divided — as to Physiology it is difficult to say what Plan is best to follow —

The Human

The Structure of the Human Body in General

The Human body may be compared to a Circle, each part supposing something to precede it – thus for example, if we speak of the Brain, the Nerves are understood; and if we speak of the Brain and Nerves, the Heart, and Arteries are supposed as contributing to their Action, and Vice versâ – The best Method seems to be first to explain the Organs, and afterwards their functions – In proceeding according to that Plan, the Structure of the Parts, and their Human Phænomena (as Data) will be first explained: Secondly, the Hypotheses formed thereon, and lastly I (Dr Hunter) shall give You my own Opinion – Lectures on Subjects intelligible in Prints are but of little Service ——

The Blood

Lecture 3d

We purpose to follow the Plan of Dr Nicholls, and therefore give a general Idea of the Constituent and Similar parts of the Body beginning with the Blood.

The Blood is that Fluid, which is contained in the Heart, Arteries, & Veins of all living Animals, and is continually circulating throughout the body. It's Colour in the Human body is red: but in some Animals it is of a differ:ent Colour. It has been called the Life of the Animal, the Magazine of Nourishment &c, as upon it's distribution and motion the Functions of Life depend, and upon it's Effusion or Stagnation Death ensues. Dr Harvey in his publication de Generatione Animalium, has two Curious & very entertaining Chapters on this Fluid: He made experiments upon it, & observed it to differ in different States and Stages of Life, & thought that it was in a more literal Sense, the real Life of the Animal, the Anima or immaterial power residing in it: that it was the Punctum Saliens which is Observed in the Incubated Egg, and called it Primum vivens, et Ultimum moriens: that the Punctum by it's irritation produced motion in the Heart, and thus was the first in Life, and last in Death. And Mr John Hunter has proved that the Blood while living is capable of forming Blood Vessels, which will unite with those already formed. We are not however to cons:ider what it is but what it's appearances are. The Colour of the Blood is always red in an healthy state, which is heightened by the Contact of Air. To the taste it is a little Saltish, & appears to be of a Gummy nature. Its Specific Gravity it is a little heavier than Water, in proportion of 1040, or 1050 to 1000, according to Jurin & Martin being a little heavier in a strong Subject, than in a Weak One. When we look at it as it is running from an Artery or Vein, it appears to be an homogeneous fluid,

but it is

The Blood

but it is a compounded one, as indeed we might imagine it to be a Priori from the different kind of Substances used in our Food, and the different kind of Secretions seperated from it, as the Saliva, Milk &c &c We shall examine it three ways, first, by the Microscope, secondly by watching it when let out of the body, & observing the Phænomena it presents to View, and thirdly by a Chemical Analysis. On Viewing the blood thro' a Microscope there appears to be a Number of little red bodies or Globules swimming in a Colourless fluid. The Proportion these bear to the whole Mass is not to be determined; it is probable it differs considerably in different people, and different Ages of Life. there appears to be a Much greater quantity of them in People in high health, & robust Constitution, than in those labouring under tedious Diseases. In common they appear to make about an Eigth part of the Whole Mass of Blood: it is supposed that 3000 of them lined in a Row like Beads would reach about an Inch in length. Dr Hunter says, that at first View they appeared to him round, in another oval, in another flat, & in another round again, from which he concludes, they are round & flat, like a piece of Money, and put on these several appearances as they turn round. Many, who have examined the red Globules, have Observed in them a Nucleus, or dark Spot in their Middle; Others suppose that the Globule is a Bag containing a fluid, others that they are Solid bodies, and Some, that its bile. We do not certainly know what they are. The red Colour of the Globules is the result of a great Number of them lined together, every single one being of a Yellowish colour; so a piece of Horn of a dark red Colour, for instance, if cut into thin Shavings appears transparent. The Red Globules are the heaviest part of the Blood, when out of, and were stagnated in the body: they are by some Means or other decomposed, for when they have been let out of the body a considerable length of time, the Globules

cannot

cannot be seen distinctly, and in extravasations they are broken down, absorbed and carried off. The Blood Globules were first discovered by Malpighi in 1665, and after him Leewenhock & others enlarged considerably on this discovery; Leewenhock took up an Idea, that a red Globule was composed of six small ones united together, & thinks that the falling of a Globule from these six Constituents is the Blood becoming Serum; & farther he supposes one of these six serous Globules was composed of six Lymphatic ones, nor ended this Opinion end here. Dr Martin has in the Medical Essays illustrated this doctrine by six Balls of Wax, which he says will be very close, on each other, and become a sphere with a little pressure. But the Moderns have totally rejected this Doctrine. Secondly, Blood drawn fresh from a Vein, and set at rest presently becomes a Jelly; in a little time after it separates into two parts, a Cake called the Cruor, or Crassamentum, and the Serum, or Whey; & if it be not disturbed, the watery part, or Serum is without any red Colour, & is of a yellowish hue, & therefore all the red Globules are contained in the Crassamentum. The Blood may then be considered as composed of three parts principally, first of red Globules; secondly of Coagulum, & thirdly of Serum. Of the first we have already spoken, we shall now consider the Coagulum or Crassamentum. If Blood recently drawn be constantly stirred with a Stick, untill it is cold, a considerable quantity of rough fibrous Substance will adhere to the stick of a red Colour; this is the Coagulum united to the Blood Globules. If this Substance be well washed in water, the blood Globules will seperate from it, & tinge the water with their colour; what remains in the Bason will continue fluid. Hence we may suppose the Coagulum to be somewhat similar to Glue, like Glue when warm it is fluid, and it jellies like Glue when cold. This coagulating part of the blood has such a propensity to coagulate when stagnate, that it separates from the other principles when Blood is extravasated in any

part of the

part of the body, and in fine acquires great firmness. This Coagulum will not dissolve in boiling water, nor in spirit of wine. Indeed if left long in the water, it would putrify like all other Animal Substances. When Blood has stagnated sometime in the Uterus or Vagina it becomes very compact, & of a fleshy consistence, and when discharged is mistaken by Nurses for pieces of Flesh, and is called a Mole or false Conception. The Superior Surface of the Cake in a Bleeding Porringer becoming highly red depends on the Air only, which is proved by Mr John Hunter in the following manner. He filled a Bottle with Blood & corked it close so as to exclude all Air, where the Blood remained as black as at first, but upon the Air being suffered to come into contact with any part of it, that part becomes of a very florid Colour. The Coagulum contracts & becomes smaller & smaller the longer it is kept wasting in time to a very considerable Mass. The Coagulum has been called by several different Names: some have called it Gluten. Malpighi calls it the Fibrous part of the Blood; it is not however composed of Fibres or Fibres like the Muscles, but forms itself into one common Concrete like the white of an Egg hardned by Boiling, as we find it in Aneurisms & Polypi. In Aneurisms, where the Circulation is languid, this first begins to coagulate at the sides of the Vessels, which are farthest from the common road of Circulation, after which another Lamina is formed & so on. In dissecting an Aneurism we find this Laminated Appearance. This coagulating Matter is generally called coagulable Lymph, but as the Serum may also be coagu:lated, we rather chuse to call it coagulating Lymph. It is the coagulating Lymph, which makes that whitish Appearance in what is called Buff, Pleuritic or inflamed Blood. After Bleeding the Cake is sometimes found of a red colour at the top, sometimes Buffy. The reason of the Blood's having a Buff on its Surface, is, because at this time, it is from some unknown

Cause

Cause rendered more fluid than it is in common, so that the red particles or Globu:
:les from their gravity subside & leave the Coagulating Lymph, which jellying by
itself appears whitish at the Surface, & when this is the Case it is Observed the
Blood is not only more fluid, but longer before it jellies, and the Buff may be
seen as it gradually forms itself - the Surface of the Blood first appears of a
purplish or bluish hue & then gradually becomes buffy - this appearance of
Buff has been generally looked upon as a Criterion of Inflammation, but it
is not much to be depended on, for Blood drawn from a pregnant Woman in
perfect health will often have this appearance, & also after Child birth, so that
we ought to depend but little on that circumstance in judging of their disea:
:ses - the Polypus in the large Vessels near the Heart so often mentioned by
Authors, & supposed to be a Disease and to cause Death, is only this Lymph
coagulated after Death in consequence of the motion of the Blood having ceased -
The Polypus is commonly found in the Vessels next the heart, & more frequently
near the Pulmonary Artery than the Aorta - It's having been found in People
who had complained of difficulty of breathing & other Symptoms, it was supposed to
have formed during the Life of the Patient, & occasioned those Symptoms, and
very often that it was the cause of Death - Dr Hunter was once of this
opinion, but what led him first to the discovery of it's having been formed
after death, was his observing that in the Pulmonary Artery, the marks of the
three large Vessels were always made on the Polypus, from whence he concluded
that at the time of it's formation, the Vessels must have been full of Blood,
of course it could not exist there during Life - And he says, that the Inferior
part of a Polypus (which is in general towards the Back, a dead body being
laid Supine) is always red in consequence of the red Globules being determin'd
to that part by their gravity, & that the Superior part has generally a buffy appea:
:rance - While the Blood is in motion it never coagulates in the Vessels, but
when stopped it does, & if we examine the end of an Artery that has been tied in
amputation

amputation some time before, we shall find that this which had concreted and plugged up the End of the Artery next the Ligature, has become a fleshy substance, & Obliterated the Canal for some distance. Whatever occasions rest of the Blood in the body occasions the Coagulation of this Lymph; for if we open an Artery in a Gangrenous part, we shall find it stuffed up with Coagulated Lymph, so far as it is included in the Gangrene. The next part of the blood to be considered is the Serum, this continues to seperate from the Crassamentum for a considerable time after it has been drawn from the body; even when Putre: :faction begins, it is not all seperated from the Crassamentum. It's Colour is different in different States of the body. In general however it is transparent & of a yellowish, or what is called an Amber Colour; sometimes we find it muddy sometimes greenish, and at other times perfectly white or Opaque. Dr Hunter once saw some of a Baker's in Carey Street which entirely resembled Milk in Colour. It is not known upon what this white Colour depends; it is however a general received Opinion, that if a Person is bled soon after eating, a milkiness is Observed in the blood, which is supposed to be the new Chyle not yet converted into blood; but this could not be the cause in the Case just mentioned, for the meat must have been as large as the whole body, to furnish a sufficient quan: :tity of Chyle to colour the whole of the Serum. The greatest part of the Serum is watery, it contains sometimes a larger, & sometimes a smaller proportion of it; by drinking plentifully it is increased, & by copious secretions it is diminish: :ed. With an heat of 150 Degrees of Farenheit's Thermometer, it coagulates, becomes white & opake; Spirit of Wine, Allum & Concentrated Acids produce the Same Effects. Chymists Observe that it contains Salts unsubdued (especially sea salt that is taken into the body with food) Essential Oils not changed into blood, & many excrementitious parts not strained from it. Philosophers find nothing permanent in this World, every thing in the Animal, Vegetable & Mineral kingdoms appears to be continually changing. In Animals, &

Vegetables

Vegetables this is clearly seen, and is apparent from Fermentation & Putrefaction — Man converts the Animal & Vegetable Substances he uses for food into himself, but dying he himself becomes putrid, and affords Nourishment to the Vegetable Kingdom — this may also be said of Fossils, particularly Metals which Dr Hunter says Dr Fordyce proved to him from Specimens of Lead — There are 3 ways to determine whether a Substance belongs to the Animal Kingdom, or not; first by burning it, All animal Substances give a peculiar smell on being burnt, thus the Smell arising from the burning of Skin, Flesh, Feathers, Horn, Hair &c is exactly the same; Secondly by exposing it to the action of mineral Acids, & to Caustic Alkali, which destroys all Animal Substances; thirdly by wetting and keeping it in a warm place, & if it is an Animal Substance it will go on to Putrefaction — We come now to the third Method of examining the Blood, that by a Chymical Analysis — Chymically examined the Blood appears to be composed, in common with other Animal Substances first, of Water, secondly Jelly or Mucilage soluble in Water tho' differing from other Mucilages, in that it is dissolved with greater difficulty in warm than in cold Water; thirdly Volatile Alkali; fourthly Gross Oil or Fat, unlike other Fat in that it produces no volatile Salt in Distillation; fifthly Essential Oil, but in exceeding small quantity; sixthly, a latent Acid (which is formed in greater quantities in Ants than other Animals) seventhly, Earth which is a native principle; it is Absorbent, & may be dissolved by Vitriolic Acid, it is called refractory Earth because it dont Vitrify, therefore Crucibles are made of burnt bones — The Quantity of this Earth is different in different parts of the body, the Blood & Flesh contain about a sixteenth part, a quarter part in the Hair & Nails, & a third or fourth part in the bones — Lastly, fixed or fixable Air which indeed is formed in every part of the body, but does not shew itself till putrefaction lets it loose & this is evident from putrified bodies swimming in Water — But whether it is mixed with the

constituent

constituent parts is not determined, and it still remains a doubt whether the Blood contains Atmospherical Air, or not; We are now pretty certain that the Body does not contain the least Calcareous Earth — When the Blood is distilled, seven eights of it appear to be Water, first a Volatile Alkaline Liquor comes over, or Spirit of Hartshorn, next a Salt which concretes in the Neck of the Vessell, afterwards the Liquor grows Oily, first of a yellow colour, afterwards black, & there remains behind Carbo, or black Caput Mortuum; this being burnt, and afterwards washed gives a small quantity of Ammoniacal Salt, and Sea Salt, an Earth remains with a small quantity of Iron, which Chymists have found to be an Almost Universal principle — In this Lecture all Minutiæ are avoided, & only such properties and Phænomena of the Blood taken Notice of, as every Surgeon & Physiologist ought to be acquainted with — By Absorbent Earths we mean, that when they are applied to the Tongue, they Absorb the Moisture, and leave a roughness on it; The Earth of Shells is absorbent and Calcareous, but Animal Earth is only Calcareous —

The Vascular System

Lecture 4th

Having explained the nature of the Blood, we come now to consider what it is contained in, and how distributed to every the minutest part of the Body; ~ the Blood Vessells perform this Office, or to use a common Expression, the Vascular system ~ The Organs serving this purpose are the Heart, Arteries, & Veins, of these the Heart may be considered as the Center: the Arteries carry the Blood from it to all parts of the body, and the Veins bring it back to it again ~ Previous to describing the Arteries & Veins, we shall just observe that the Heart is a composition of Muscular bags, that these bags are very strong & four in number, two of them call'd Ventricles, from whence the Arteries arise, and two call'd Auricles with which the Veins communicate ~ An Artery is a hollow flexible Tube beginning at the Heart, which has a pulsating Motion, & serves to carry the Blood from the Heart to all parts of the body for its Nourishment, & as it recedes from ye Heart is divided into innumerable branches, so extensively distributed thro' every point of the body, that a Wound cannot be made with so small an Instrument as the point of a Pin, without injuring some of them ~ Even the Coats of the Veins are supplied with numerous Arteries ~ Hence some of the Ancients were of Opinion that the Arteries formed the Whole Animal body ~ The Word Artery in Greek from whence it is derived, signifies an Air Carrier, & appears to have been first used for the Wind Pipe ~ The Ancients call'd all the Vessells indiscriminately by the name of Veins, till it was found that one kind of them had a power of contraction & Dilatation: Supposing this kind to have the property of drawing or sucking in Air, they named it Arteries; ~ There are only Two Principal Arteries in the body arising from the two ventricles of the Heart, viz, the Aorta, or that arising from the left Ventricle, and the Pulmonary Artery, or

that arising

that arising from the Right Ventricle - the Aorta is distributed into an infinite number of Ramifications thro' all the several parts of the body; the other distributes the blood thro' the Lungs - the Pulmonary Artery was before the discovery of the Circulation of the Blood, called a Vein, & seeing it resembled an Artery in some respects, they called it Vena Arteriosa, or Arterial Vein -

The Branches of the Aorta take names from the parts to which they are distribu:ted: those of the Pulmonary Artery having no particular names - The arteries are ramifying Tubes of a Conic Figure, perfectly round, because always full of Blood when free from pressure - Arteries send off branches, like Branches from a Tree: the part they are sent off from is called the Bifurcation of the Artery - When an Artery divides into two Branches, the Diameter of the Two added together is greater than that of the Trunk they proceeded from: hence the Sum of all the branches taken together are much larger than the Trunks which produced them - It is an almost general Rule, that the branches of Arteries go off at acute, yet many of them go off at right, & some at Obtuse Angles - and as an instance of the last, the Epigastric Artery is brought, but this is a mistake, for the Epigastric Artery at first goes off at a right Angle, & then turns afterwards, & makes an Obtuse One - the nearer the Heart a Branch goes off, the greater is the Angle. In the small branches there are all sorts of Angles & Directions, particularly in the Anastamosing branches, & in the Extremities they run almost parallel. Every Artery, which is large enough to carry red blood, is called by the name of Sanguinary or Sanguif:erous, and those which are too small to admit the red Globules, but ad:mit the Serum, are called Serous, or Seriferous Arteries, & these are liable to be so affected as to admit red blood into them, which is called an Error Loci - this may be seen in an inflammation of the Eye, where the Vessells of the

Tunica

The Vascular System

Tunica Conjunctiva, which naturally carry only Serum, are filled with red blood.
As Lewenhoek supposed six Lymphatic Globules formed a Serous Globule, & in six Serous ones a red Globule, so he also imagined there were three orders to carry them. But as Lewenhoek's Doctrine of the Globules is doubted, the term Lymphatic Artery is laid aside; and indeed from the late discoveries, we find that the Lymphatic Vessells are not continuations of the Arteries, but do of themselves form a System: And as we are not able to see any smaller Arteries than the Serous, and not then till they are made evident by an Error Loci; the Moderns retain only the two Orders of Sanguiferous and Serous. Both Arteries, where they begin from the Heart, have Valves, whose Office is to prevent the Blood's return upon the Heart, when the Arteries contract. In general they are three in number, tho' sometimes there are four, & sometimes but two, but they all answer the same End, & the Varieties we find in different bodies is generally in those Cases, where the Serous will answer as well.
The Branches of the Aorta in general take the straightest road to the parts they are distributed to, & as near as possible in the Center of the parts they pass thro' supposing the body to be in it's natural position (in the Limbs very close to the Bones). The most natural State of the body is when it is without Action, & in health; it is then neither sitting nor standing. For example, suppose a Man drunk, or Heedless, he does not lay with his Limbs straight, & at length on his back, but in the easiest posture, on his side with his Legs, & Arms half bent, his Body and Head bending forwards, so as to bring all his Muscles into a State between Contraction & Relaxation. In this state of the Body, the Arteries go to the several parts by the shortest way always on the hollow side. Accordingly we find the

Artery

The Vascular System

Artery, when it leaves the Abdomen situated in the Groin, which is the hollow part when the Hip is bent, it then passes straight down to the ham, from before to behind, which is likewise the hollow part when the Knee is bent, & so on in the straightest course possible to the Foot; the same may be said of the Artery in the Axilla passing into the bend of the Arm &c. The advantages attending the Situation of the Arteries is manifest, as they are hereby secured from injury better than they could possibly have been in any other position: for instance, had the Inguinal Artery passed down the back of the Thigh, it would have been injured by pressure; likewise if it passed over the Knee, it would have been hurt on a thousand Occasions, the Arteries run sometimes in a Serpentine Winding form, which Dr. Friend supposed was to prevent their being stretched in parts which are liable to be distended, as in the Cheeks & Uterus: But it is certain that they do not become straighter when the Uterus is pregnant, for they become more convoluted. The Arteries continuing to branch on, at last form a Net-work or Anastamosis, that is, their mouths open into one another, like the Vessells on the leaves of Trees. The largest Anastamosis is on the Brain. The Moderns have always understood an Anastamosis in this sense. The Ancients had a different meaning for the Word, they supposed the extremities of the Serous Arteries opened on the different surfaces of the body as on the Stomach &c. Hence Galen speaking of an Hæmorrhage accounts for it either from a rupture of the Vessells, or from a soaking thro' its Coats, or percolation; or lastly from an Anastamosis in which he supposes, that the Small Arteries, which open on the Surface of a Cavity, are so far dilated as to permit the red blood to pass thro' them. The General Uses of

anastamosis

The Vascular System

Anastamosis is, that the blood may be the more equally distributed — When the Artery is tied in the Operation for the Aneurism, the Circulation thro' the Limb is afterwards kept up by means of the Anastamosis, which otherwise must have perished — The Coats of an Artery are white with a yellowish cast, very much resembling that Ligament in the neck of a Calf, called white: :Leather — There are two Opinions held with respect to the Contraction of an Artery, some supposing it to depend on Elasticity, others that it is a Muscular Action — An Artery is a pretty firm Substance, and Anatomists have observed it to be of a different texture, & have divided it into three Coats — The Internal Coat is an exceeding thin, smooth, polished membrane, it's fibres are so very fine, as not to be discernible, it has very little strength, The Second Coat is composed of Circular fibres, very visible to the naked Eye, resisting great force when pulled in a longitudinal direction, but easily separa: :ted when pulled sideways, these fibres as they run outward change their situa: :tion, and running in every direction form the third Coat — Some Anatomists describe a fourth Coat, which they call the Cellular Coat, but this cannot be properly reckoned a Coat, it is only a covering which it has in common with other parts of the body from the Cellular membrane — The Use of the three Coats is very apparent: Had not the first been so fine & smooth the blood would have soaked thro'; — The second & third give strength to the Vessells — These Coats live & are nourished by Vessels called, the Vasa Vasorum, and from the nervous influence upon the Arteries, it is supposed they have nerves too — This influence is very great, for example let some Ideas rise in the mind, & instantly the whole Face is cover'd with a Blush, which affection is an Error Loci of the Blood in the Vessels of the Skin of the

Face —

The Vascular System

Face, but Dr Hunter believes if they have nerves, they are but few, as the Arteries appear to be very insensible — the Blood by the muscular contraction of the Heart is forced into the Arteries, fills them throughout, and distends their Coats. This swelling of the Arteries is called Diastole; the Arteries react upon the blood either by a muscular power, or from Elasticity, and pushes it forwards, while in this action, the Arteries are said to be in their Contraction or Systole — It was a common Opinion with the Old Physiologists, that the Arteries had those motions of themselves, and by this means they drew the blood from the Heart, for said they, if the motion of the Blood is owing to the action of the Heart, propelling it thro' the arteries, why do those Arteries, which are at the greatest distance, pulsate at the same time, with those that are the nearest to it — To give a satisfactory Answer to this Question, we need only say, that the Arteries do not all pulsate at the same time, of which any Person may be convinced by putting a finger to the Carotid Artery and another to the Artery at the Ancle — Although the size of an Artery in its pulsation seems to be increased very considerably, yet we find that it is not much so — This was made very plain to Mr John Hunter in the Carotid Artery of a man laid bare, for tho' he was strong, & his pulse beat very forcibly on the finger, the dilatation of the Artery was so very inconsiderable as to be hardly perceptible, so that the difference of the feel between a contracted & distended Artery, seems to be rather a tightness than an increase; so in propor:tion as the Arteries are filled in an highly injected Preparation, they appear more Serpentine — The Systole depends on the Coats of the Arteries reacting

reacting on the blood, either as Muscles, or Elastic Substances – Physiologists are not agreed what that power is, they call it the Power from the Irritation of Distension – Some have said, that the Action of the Arteries contribute nothing towards the Circulation; but Dr Hunter is of opinion, that they contribute to it greatly, & independant of their Elasticity, which power he thinks may be called Muscular, for endeavouring to inject Milk into the Mesenteric Veins by the Mesenteric Arteries in a dead Subject, he met with great difficulty, but in a live Animal it readily passed down from the Artery to the Vein without any further force than filling the Artery with a Syringe, and then stopping the Orifice with the finger it passed of itself – Whether this power is Muscular or not cannot be determined – We see that Muscular fibres contract, but cannot tell why they do so – The most minute Arteries have little or no sensible Motion, because their Capacity taken together, is much greater than the Trunk they sprang from: for the same Reason the Velocity of the blood is greater in the large Arteries, & grows weaker & weaker in the small Ones, till it's Motion becomes imperceptible – Whatever blood the Trunk, & large branches of the Aorta receive; they receive from the contraction of the Heart, which not throwing out constantly, but at Intervals, produces in those Arteries a thumping, or Jerk, when it distends them, but as the blood moves on towards the small branches, it is propelled by two powers, the Heart, & the Action of the Arteries alternately, these two powers then will force the blood thro' the small branches into the Veins in a constant stream, like the Wind issuing out from a double pair of Bellows, – This is the reason why the Veins, which are only continuations of the Arteries have no sensible Motion –

The Arteries

The Vascular System

The Arteries in dead bodies are commonly found empty, which is a Phanomenon that has not yet been accounted for. With the Circulation of the blood the knowledge of the Pulse is connected. The Pulse is the Criterion by which we judge of the action of the Heart. In this the moderns have the Advantage of the Ancients, that it is a very distinguishing mark of the state the body is in, and we may draw great help from it, making a just prognostic of a disease; Yet we must always remember that the Pulse varies very considerably in different People, and that a thousand different things will affect the Pulse independant of diseases, particularly the passions of the mind.

In general the Pulse beats about 70 or 80 times in a minute, yet we sometimes find a Pulse always beating in health 100 times, or more, and Dr. Akhew in common health had it beat 150 in a minute for many years. In young Children it is quicker than in Adults, and in every person it is quicker in the Evening, than in the morning. A Pulse is said to be large or small, hard or soft, but a perfect knowledge of them can be only acquired by Habit.

Diseases of the Arteries

Lecture 5th

The Diseases of the Arteries are next to be considered. There are two diseases to which the Arteries are very subject, an Aneurism, or Dilatation of their Coats, of which we shall speak hereafter, & their Ossification, or changing into bone. This last is a disease to which persons of an advanced age are most liable; and is found generally in the Extremities, particularly the lower Ones, tho' there is no Artery but what is liable to it: even the Aorta is frequently Ossified. The Ossification always begins on the inside of the Artery, gradually shooting outward. Dr Hunter is not certain whether the blood touches the bone or not, but believes it does not, as he thinks he has found the fine smooth Coat on the inner Surface next the blood. It has been a common Opinion, that the Ossification happened in consequence of a disposition in the Solids to grow harder as age advances. For say they, the Solids of a Young Subject are softer than those of an Old One; Old People have many parts bony, which in Children are soft, that so in like manner the Arteries become bone. But this Ossification is certainly very different from the Ossification of Fibres, and is owing to some peculiarity in the Constitution, or else we should find Ossifications always more, or less frequent, in proportion as People are Older or Younger, and pretty certainly in Old Age, which however is by no means the Case, for they are sometimes found in Subjects under 40 years of age, & often in very Old Subjects there is not the least appearance of Ossifications. Dr Hunter dissected a man, who died at the Age of 105, & could not find the least Appearance of Any Mortifications of the Extremities, especially of the Toes & Feet, being very frequent in Old Age, & which have been supposed to be owing to this Cause, & accounted for by saying that the

Circulation

Diseases of the Arteries

Circulation growing languid from the Arteries being incapable of forcing the blood forwards, at length stops, & the part for want of nourishment dies. This, tho' it may be the Cause sometimes, is far from being so always, as most commonly in these Mortifications there is no Ossification to be found. There was a Man in St. George's Hospital who had an Ossification of the Carpal Artery, so that when the Finger was first applied to it, no pulsation could be distinguished; & upon pressing it with the finger firmly the bony Coats were felt to Crush like an Egg Shell: It is probable in Amputations, where the Surgeon has been baffled in his attempt to restrain the Hæmorrhage that this had been the cause; when we meet with any difficulty, then it will be right to examine the End of the Artery, & proceed accordingly. It is necessary to Observe when we speak of the body, in general, we call those the extreme parts, which are farthest from the Trunk, as the Hands & Feet, but in speaking of an Artery, we call that an extreme part of the body, where the Artery terminates; in this Sense every part is an extreme part, even the Heart itself.

The Veins

A Vein is a ramifying Tube, in a general sense very similar to an Artery, but differing in this particular, that they begin to arise in the extreme parts of the body, and end at the Heart; therefore in an Anato: :mical Sense they are very similar, but in a Physiological One they are different, as we say the Arteries begin at the Heart, & terminate at the Extremities. There are six principal Veins which terminate in the Heart, two which answer to the Aorta, & bring back the blood which it carries out, namely the Venæ Cavæ Superior & Inferior, which end at the right

auricle

Auricle, and the four Pulmonary Veins that bring the Blood back from the Lungs, ending in the left Auricle — The Auricles open into the Ventricles, and thus the communication between the Arteries & Veins is kept up — In general the Arteries & Veins run together, but they may be distinguished from each other, by the Veins being larger and their Coats thinner than those of the Arteries — When the Veins are empty, or cut through, they become flat. They branch as the Arteries do, & anastamose in the same manner, with this difference however that the Anastamosis is more common in the large Veins, particularly in those of the Limbs — Their division, as that of the Arteries, is into Sanguinary, or those which carry red blood, and Serous or those which carry only Serum: there were what was called Lymphatic Veins, but since the discovery of the Lymphatic System, this term has been rejected — Harvey discovered the Circulation at a time, when the minute parts of the body were not well understood — He & the Anatomists before him could see that the Arteries & Veins branched out smaller & smaller, but they had no Idea of the infinite number of fine branches extending every where, they conceived therefore that there was an intermediate Spungy or Cellular flesh placed between the extremities of the Arteries, and beginnings of the Veins, forming a kind of net-work Labyrinth between them, that the Arteries threw the blood into that Spungy flesh, & that the Veins took it up again — Malpighi, Lewenhoeck, & other Injectors made it out clearly that the Extremity of an Artery terminated immediately in the beginning of a Vein — that the Veins are a continuation of the Arteries is made evident by injection, for we can fill the Veins of the hand by the Artery, & if we examine it, we shall find the Quicksilver no where contained in a Spungy Substance, but every where in Vessells — It is an easy matter to inject the Quicksilver by tying a pipe into the Carpal Artery, and pouring into that pipe a quantity of

Quicksilver

The Veins

Quicksilver, so as to make a Column of it, to suspend the hand with the Fingers downwards, & the quicksilver by it's gravity will gradually get into the Vessells, & make them apparent thro' the Skin, and when they are sufficiently filled, secure it from running out; While the Vessells are filling, the quick=:silver will be seen just as high in the Veins as in the Arteries, & if the hand be inclined to any side, it will make it's way immediately to the most depending part, which fully convinces the communication between the Arteries & Veins to be a very ready One. What seems to prove this farther is a Preparation of the Secundines of a Puppy; the Arteries are filled with white, & the Veins with blue Wax, and where the Vein and Artery meet, the blue is seen mixing in the same Vessells with the white. In favour of their being a Spongy flesh between the Arteries & Veins, the Corpora Caverno=:sa Penis are produced as an instance; but even here it is not evident that the Artery throws it's blood into a spongy substance, & that the Vein absorbes & carries it off. There was also supposed to be a beginning of Veins from the Surface of divers parts of the body which were believed to absorb & carry into the blood particles from without: As a proof of this it was said that Mercury rubbed on the Skin was absorbed by these Veins & produced a Salivation, but it is now made very evident that the Lymphatics do this Office. In general the Veins are situated with the Arteries, running along with them wherever they go, particularly in the Stomach, Liver, Spleen, & Intestines, but in some parts they differ much, especially in the Arms & Legs. In these, besides the Veins which run with the Arteries, there are Superficial Ones having no Arteries accompanying them. Thus the Veins on the back part of the hand run to the inside of the Fore-arm, & form two great Trunks called Basilic & Cephalic Veins, which have no corresponding Arteries. there are also like Veins, on the Feet, Legs,

Thighs

The Veins

Thighs, Neck, & Head &c. — Dr Hunter says he has often thought of these Superficial Veins going alone, & why they do go in this manner differ:ent from others, and supposes it to be for this reason that muscular motion requires an increased circulation of blood thro' those parts immediately in action, and therefore these Veins are provided to carry off this greater quantity of blood, least the deeper seated Veins should be pressed upon by the action of the muscles, and a check to be given to the circulation thro' them. — A Vein is elastic, & appears to be more so than an Artery, and its Coats being thinner it appears to be of a much closer texture, & to want the Circular fibres, which make the second Coat of an Artery, so that it cannot be divided into different Coats. — It is nourished by the Vasa Vasorum like an Artery, & probably is furnished with nerves, tho' they cannot be distinguished. — Within the Veins there are Valves made of two Semilunar Pellicles, which suffer the blood to pass towards the Heart, but prevent its return — where these Valves are placed, they cause a Swelling of the External Coat of the Vein, like the Joint in a Reed or Cane — most of the large Veins have no Valves — the Veins of the Lungs, Liver, Stomach, Intestines, Pia mater &c have none — they are formed principa:lly in the Limbs: the neck has some, but in the arms many are placed within two Inches of each other — the Use of the Valves have not as yet been satisfactorily accounted for by Physiologists. — Some have supposed that they served to counteract the weight of blood, when the body is in an Erect posture, but had this been the View of the Creator in forming them, we may ask, why are they placed so close in the Veins of the Arms? and why is the Vena Cava Inferior (which supports a Column of blood two or three feet high) entirely destitute of them? It is plain in this Case the Phanomenon does not agree with the Theory — Dr Hunter

conjectures

conjectures, that as Muscular Motion requires a greater quantity of blood and as the pressure of Muscles in Action serves greatly to increase the motion of the blood one way, that is, towards the Heart, and as the extremities are the members chiefly used in all Exercise, that they are placed princip:ally in the Veins of the Arms & Legs therefore, & not in the other parts of the Body — The Motion of the Blood thro' the Veins is continually accele:rated as it approaches the Heart, because it has less Space to move in, for the very same reason that it moves quicker in the large than in the small Arteries — The Veins have naturally no pulsating Motion, but someti:mes a single Vein is found with a Pulsation, and sometimes there is such a general change wrought in the body, that many or most of them have been found to pulsate, as Dr Hunter has twice or thrice Observed —

In Bleeding it is often Observed that the blood is emitted with a Jerking Motion, but this happens only in consequence of an Artery lying contiguous to the Vein —

Phlebotomy

We are now to consider the Effects of Phlebotomy, what change it will produce in the Circulation — When a Vein is opened the Circulation will be a little quickned in that part, & but a little — It may be necessary here to Explain the former Doctrine of Derivation and Revulsion, on which so many Books have been written — Suppose then a Woman with an Obstruction of the Catamenia, we bleed at the Ancle, that a great quantity of blood may flow to the lower parts of the body, this is making a Derivation — Again supposing a Man labouring under a Phrensy, or an inflammation of the Brain, we again bleed in the Feet, not to

make a

Phlebotomy

make a Derivation to the lower Extremities, because they have too little Blood, but with respect to the Brain, or it's Covering which have too much, this is making a Revulsion. — In all Ages taking away blood has been approved of for stopping Hæmorrhages & it has oftentimes a very good Effect. But Dr Hunter thinks this remedy is often too much used, especially in Uterine Hæmorrhages, and thinks the method often followed by the Ancients to be better namely to make Ligatures on different parts of the body, and by that means to give a Check to the Circulation. — Dr Hunter says, that the Tendency in the Constitution of our bodies to stop Hæmorrhages when they become prejudicial to hea:lth is exceeding great, far byond what is generally imagined; that he has been with Hundreds of Women, who have had very profuse Ham:orrhages in consequence of Miscarriages, and have been to all appea:rance dying with cold Sweats, difficult Respiration &c. yet never knew that one died, unless they were far Advanced in Pregnancy, for when the Woman becomes Weak thro' Loss of blood, the Action of the Heart grows weaker, & weaker, till She faints, and the Hæmorrhage stops of itself. Great mischief may be done at this time by giving Cordials, for tho' at the time they are taken, they give a momentary Refreshment, yet by stimul:ating the Heart, they often renew the flooding. It is amazing what quantity of blood Some Women lose, and yet do well. Now we have described the Arteries and Veins, we shall just describe a few particul:arities in both. All the Vessells are Elastic, which is a great advant:age, as they can by this means adapt themselves to their contents, which often prevents our being destroy'd by great Hæmorrhages; Secondly

they enlarge

Phlebotomy

they enlarge in proportion as the Bulk of the parts increase, in which they are situated, as in the Breasts of Women, but particularly in the Uterus, & their Coats grow thicker at the same time, which is a circumstance that has not yet been accounted for — Again in an Artery Opened, and which has discharged it's blood into a Vein, one would at first imagine, that as the Blood was drawn off, the Artery would grow smaller; but it is just the reverse, for the Circulation being accelerated thro' the Artery, it increases in bulk in proportion as the Circulation increases — This is evident in the Varicose Aneurism — Lastly all the Vessels have a Tendency to contract, independant of their Elasticity or Muscular Power, & where the Blood cannot circulate freely, the Arteries become smaller & smaller, till at length they are contracted into Solid Cords ——

The Absorbing System

Lecture 6th

Having now considered the circulation of the Blood throughout the body, we shall next consider its appendage the Absorbing System — As the Blood serves to repair the daily waste made in the Constitution it follows that there must be some provision made for renewing it, for which purpose serves the Aliment we daily take for Food — The nutritious particles of the food proper for making blood is taken up by very small Canals arising from the Surface of the Stomach & Intestines every where, and carried into the Blood Vessells; these are so very small as to be imperceptible to the Eye which was necessary that nothing might get into the blood, but what was small enough to circulate thro' the minutest Vessells — These Vessells, which Absorb the Alimentary juices, and carry them into the blood, are called Lacteals, or Lacteal Vessells — The Lacteals with another Class of Absorbing Vessells form a System different from the arteries & Veins, called the Lymphatic System — But before we enter upon it we will by way of Introduction first consider the Opinion concerning exhaling Arteries, and Absorbing Veins — It has been supposed by Anatomists, that besides the Arteries & Veins already described which anastamose with each other, there was another Series, which arose from those as branches, that Some of these small Vessells (or Exhalant Arteries) opened on the Skin, thro' which the matter of Sweat & Perspiration was supposed to pass, while others of the same kind were supposed to throw out a fine liquor on all the internal Surfaces of the body, to keep them supple & prevent the parts from adhering; and as a proof of this they said that if a body was opened soon after Death, the several Cavities & Surfaces were always found in

a moist

The Absorbing System

a Moist State, Supposing then this fluid poured out a question arises, what becomes of it? the answer is, there were inhaling or absorbing Veins, beginning not from the extreme branches of the Arteries, as the other Veins do, but from the Surfaces of the body, which take up this fluid, & carry it into the Veins. (The absorption by the Skin is granted by All, for the method of Salivating by Mercurial Unguents is a sufficient proof of it. In health what is exhaled & absorbed balance each other; if a greater quantity of fluid should be thrown out, or a less quantity absorbed than usual, it brings on Leucophlegmatic Dropsy. If any Cavity suffer in particular, it occa: :sions a Dropsy of that part, as we see is the Case in the Ascites, Hydrops Pectoris, Hydrocele &c). It appears doubtfull whether there are any Exhaling Arteries, or no: but seems very probable that there are none. The fluids that these were supposed to carry, we shall for the future call Interstitial Fluid. Whether the interstitial fluid is carried to the Surf: :aces of the body by exhaling Arteries, or transudes the Coats of the Arteries cannot be determined Absolutely. This however may be said, that the arguments made use of, do not by any means prove the Exhalation. They say in support of it, that if you inject the Arteries with a Subtle fluid, it gets into the Cavities of the body, and then Ask, if there are not Exhaling Arteries how does the Blood get into the Cavities? now nothing is more plain to a Working Anatomist than that Coats of the Vessells allow of Transudation. The Blood in the dead body transudes everything except the Cuticle. There is one Experiment if true, that will undoubtedly prove the Exhalation on the Skin. Boerhave, Haller, & others have said that upon injecting Quick: :silver into an Artery, a dew of fine Globules arose on the Skin. The truth of this Experiment Dr Hunter very much doubts, as he never has been Able to make any Injection pass the Cuticle, he is of Opinion that it is by

transudation

transudation, for he thinks if the Exhaling Arteries & Inhaling Veins were a Series of Vessells branching off from the larger Veins & Arteries, we might reasonably expect by injecting these, to fill those also, which we never find to be the Case, tho' he supposes that the Matter of Sweat & Perspiration is thrown off by Exhalation — By the parts surrounding the Gall: Bladder being tinged, it would appear that the Bile itself would transude, but Mr John Hunter says, that this transudation does not take place till after death, which he is convinced of from having opened several live Animals & others just dead in Order to examine those parts — It is not a Matter of Much consequence which way it is performed, & therefore we leave it a question whe: ther the texture of the Coats of the Minute Vessells is not so close, but that this Interstitial fluid can pass thro', or whether it is thrown on the several Surfaces, from the Mouths of small Arteries opening thereon — The Next question is, what becomes of this Interstitial fluid? Anatomists have been of Opinion that it was taken up by Absorbing or Inhaling Veins opening upon the parts as before Mentioned — The Experiment given to prove this opinion is hardly to be believed. It is said that the Abdomen of a live Dog was opened, & Warm Water thrown into the Stomach & Intestines, that in a little time all the Veins about grew very turgid with the Water, and remained so till all the Water was Absorbed, & carried off; but Dr Hunter says that in Experiments of this kind at which he has been pres: :ent, he never Once Observed, that the Veins were made More turgid by the water — There are Many Arguments for the Lymphatic System that prove the Contrary of this Opinion — Dr Hunter says that this fluid is not taken up by the inhaling Veins, but by the Lymphatic Vessells — All the red Globules of Blood are kept within the Vascular System during Life, but after Death they transude, and colour all parts of the body in proportion to the time it has been dead. Transudation may perhaps happen in

consequence

The Absorbing System

consequence of the Vessells having lost their tension, but more probably from the blood Globules being broken down & dissolved — If an Artery is taken from an Animal lately dead, and filled with Water, tied close at each End, and laid in an horizontal position, yet the Water will transude, and it will be quite empty in a little time — The Lymphatic System has been known but a little more than an hundred Years — Anatomists before that time supposed, that the Nutritious part of the food was Absorbed by the Mesenteric Veins, & carried by them to the Liver to be changed into blood. This Office however is since found to be performed by Very small Vessells called Lacteals — In most parts of the body there are exceeding fine Vessells with very fine Coats, & a great Number of Valves — The fluid they carry having little or no Colour is called Lymph, and the Vessells themselves Lymphatics — As the fluid they contain can pass only One way on Account of the Valves, and that is from the branches towards the Trunk, they may be called Veins — In Some parts of the body these Vessells run solitary without giving off any branches, in Others parts they form wonderful plexus's of Vessells: the outer Coat of the Liver seems entirely formed of them — Another difference between these Vessells, and the Arteries & Veins is, that an Artery or Vein becomes smaller & smaller in proportion as they branch more & more from their Trunks, but a branch of a Lymphatic often grows much larger than the Trunk it proceeded from. Another peculiarity is that the Lymphatics in their course all naturally run into a Lymphatic Gland, entering at one side, & coming out at the Other — The Lymphatic Glands are small, oblong, & round bodies commonly called Kernels, & were by the Old Anatomists called Conglobate Glands, — When they were first discovered, seeing that they were in general seated near large blood Vessells, as in the Arm Pits, and Groins

Groins, they were supposed to be placed there to support these Vessells. Nuck who first discovered these Glands, says they are composed of a Cellular Substance, that a Lymphatic Vessell on entering one of the Glands divided into many branches, which carried a fluid into the Cellular or Spongy Substance, that from this Spongy Substance it was absorbed by those going out on the contrary side, in the same manner as Harvey supposed the Blood to pass from the Arteries to the Veins. This opinion of Nuck's was held as sound Doctrine. Mr John Hunter has made several Expe:riments to determine whether this Substance is Cellular or Vascular, but has not been able to determine the point. Dr Nicholls, and the present Professor Monro of Edinburgh, say, they are wholly Vascular, & so did Ruysch. When the Lymphatic quits the Gland, the branches are united into one common Trunk, which as it proceeds unites with Others, till they form one large Vessell near the Spine called Receptaculum Chyli, & Ductus Thoracicus, which at last enters a Vein, so that whatever is carr:ied by the Lymphatics goes into the blood. This System therefore is plainly an Appendage to the Blood Vessells. The branches of the common Trunk of the Lymphatic Vessells have two different names, in all parts of the body except the Intestines, they are called Lymphatic Vessells: Some of these are deep seated following the course of the Arteries, others run very superficially, & there is something peculiar in their distribution to every particular part. Those Vessells which arise from the inner Surface of the Stomach & Intestines may be properly called Absorbent Lymphatic Vessells of those parts: But when they were first found, from their being full of a milky fluid they were called the Lacteals or Chyle Vessells, which Name they still retain: they run from the Intestines to the Mesenteric Glands, and from thence to the Loins where they unite with the Lymphatics from other parts, and form one common Trunk. As far as we can judge a Lacteal is like

The Absorbing System

is like a Lymphatic in every circumstance, going into, & coming out of Lymphatic Glands, in their passage to the common Trunk —

we shall next consider the Use of this System. It was a common opinion that the Lymphatics were a continuation of Arteries & filled by them — now as it was known long ago that the Lacteals arose by imperceptible Orifices from the Intestines, & carried the nutritious part of the food or Chyle to the Blood Vessells, it is surprizing that the Lymphatics should be thought to be continuations of Arteries — A strong proof that the Lymphatics are not continuations of Arteries is, that all Lymphatics have Valves, which the Arteries have not, and many Other facts serve to confirm, that they are a System of themselves, an absorbing System from all parts of the body where:in Absorption takes place; and that there are no absorbing Veins is a fact confirmed by many Observations. As the Lymphatics Absorb from all the Surfaces of the body whatever is capable of being taken in by them, & as they pass thro' Glands, if any fluid of a poisonous or irritating quality is of parts small enough to be taken into them, it often stops at these Glands & inflames them: thus Venereal poison occasions a Bubo in the Groin if the infection was received by the Genitals, & afterwards is carried into the whole habit. Dr. Hunter says, he received the first hint of the Lymph:atics being Absorbing Vessells from a Friend's asking him his Opinion of Mr. Frekes Chirurgical Publication (about the year 1748) to which he answered, that he had not read it; his Friend then mentioned Mr. Frekes advising a Surgeon in Venereal Cases to cut out a Bubo from the Groin, for that he said, he would by that means eradicate the poison, which he supposed was conveyed in some way or Other from the Genitals to the Inguinal Gland, & detained there. This the Dr. says struck him imm:ediately so that it came into his imagination, that the Lymphatic Vessells were the

Conveyors

The Absorbing System

Conveyors of the poison – Taking up the Subject upon this supposition, he was by numerous Experiments & Observations soon convinced that he was right in his conjecture – Daily experience confirms the truth of this doctrine. Mercury applied to the Skin is Absorbed, from thence carried into the Circu: :lation & produces a Salivation – Garlic also may be Absorbed from the Skin, & carried into the Vascular System, as is Evident from its being sepe: :rated from the blood by the Kidnies along with the Urine, & giving that its own particular Smell. After Venereal Infection, a Bubo arises in the Groin, in consequence of the poison's being detained in it's passage thro' the Gland; if the Bubo suppurates, the poison is evacuated with the Contents of the Bubo, & no other Symptom for the most part arises, but if the poison pass thro' without occasioning a Bubo, or if the Bubo disperse, then other Symptoms make their appearance – We can even see the very Lymphatic by which the Poison is conveyd away – For from Venereal affection two kinds of Chordees may arise, the first & which is the most common happens in consequence of the Cavernous body of the Urethra being inflamed, so that the Penis when erected is drawn downwards in a Curve, the second is when the Penis seems to be bound round with a tight Cord, which is owing to a Lymphatic Vessell being inflamed, that runs in that direction – If the Infection be received by the finger, it is first carried to the Glands in the Axilla, if by the mouth to the Glands in the Throat. Dr. Mackauley after dissecting a dead body infected with the Venereal Disease, shewed Dr. Hunter his Arm; there was a red Streak extending from a small Wound in his finger along the Fore Arm, which disa: :ppeared at the bend of the Joint, & appeared again above the Joint running into the Axilla where a Bubo was formed – Near Cancerous Ulcers these inflamed Lymphatics are often seen – When a Woman's milk is going off, she is

The Absorbing System

She is frequently seized with a Rigor, & feverish Symptoms come on in consequence of the Absorption of bad Milk into the Constitution, and it is no uncommon thing for her to have a Bubo in the Axilla. Any Ulcer furnishing a sharp Matter may occasion an inflammation of a Lymphatic Gland, to which the Lymphatics of that part where the Ulcer is situated, lead, indeed in such Cases these Glands are always more or less diseased. When from any Cause, these Glands are obstructed, the Inguinal ones for instance, the Lymph will accumulate in them, and give the Appearance of a Bubo, & the Limb below will become Œdematous, and when from distention the Gland bursts, the discharge will be Lymph, not Matter. In such Cases the Dr advises to do Nothing, he says that by degrees some other Lymphatic will dilate sufficiently to Carry off all the Lymph, and the part will heal of itself. When the Limb is much swelled, dry Frictions may be recommended to promote this End. Besides explaining a considerable part of the Animal Œconomy, the Use of this System will be found in explaining a variety of Appearances in Diseases, especially in the Scrophula, which is a disease in which the Lymphatic Glands are first, & principally affected. The common Opinion that the Scrophula is caused by a bad humour in the body, and that that humour is Hereditarily derived from Parents to Children is certainly without foundation. Dr Hunter says, he does not believe a Word of constitutional bad humours, & he thinks that the Blood is not at all Affected in this disease, but that it is owing to a fault in the Lymphatic Vessells from their Orifices being too bibilous, and Absorbing improper things; it is therefore a faulty Absorption that is the cause of this disease, and we commonly find the Scrophula attack Children, and People of Lax Habits, and fair Complexions. If this doctrine be true, we perhaps at length hit on some method of treating this disease more successfully than hitherto

has been

has been done — This will not consist in purging or carrying bad humours out of the constitution, but by correcting the faulty Absorption the remedies that have been found most Effectual in this Disease serve to confirm this Doctrine; they are the Bark, and Sea-bathing, the first braces the body, and in Some measure stops Absorption, the other appears to Act much in the Same manner, while the Shock from the frequent Plunges in the Sea may probably produce Some Change in the System — Sir Lucius Obrien very lately informed Dr Hunter that it is the Opinion in Ireland, that the Scrophula is a Vermicular disease, and that in many Scrophulous Cases very small Worms had been found in the Diseased Glands — Dr Hunter says, if this be true it serves to confirm his Doctrine of the Use of the Lymphatics. For he supposes that their Ova must be Absorbed from the surface of the body by these Vessells, and lodged in the Conglobate or Lymphatic Glands — Having now gone the round of Circulation and Absorption, we now proceed to another Appendage to the Vascular System, to wit the Various Glands ———

The Glandular System

Lecture 7th

As there is daily a greater quantity of Chyle carried into the blood, than suffices for the nourishment of the body, it was necessary that the redundancy should be thrown out together with such other particles of the Blood, as were become noxious & useless, for this purpose serve the various Glands and also to prepare some particular fluids necessary for the Animal Oeconomy. It is difficult to define what a Gland is, we mean by it a circumscribed mass of Flesh, made principally of Blood Vessells, whose office is to seperate something from the blood. The Latins called them Glandulæ, and Glandes, which signify Kernels. The true Structure of a Gland is not known. All Anatomists till Malpighi's time had but a vague notion of these parts; they supposed, as we find from Galen, that they were a composition of Spongy Flesh, some of them made to support Blood Vessells, and some to strain off fluids from the blood: this Spongy texture they called Parenchyma, and supposed that the Secreted fluid was strained thro' it in the same manner, as water thro' Sand, or a dripping Stone, nothing more was known till Malpighi took up the Subject. He carried on his researches with great Care by the help of Injections & Microscopes, and used Ink instead of wax for his Injections. He was of Opinion, that the Glands were principally composed of Blood Vessells, but that their Parenchyma was formed of Small Vessells or Bladders. Some of the Glands he called Simple Glands, of this kind he says those little bags are, which are situated near the Root of the Tongue, & are surrounded with many small risings of flesh; the Follicle itself is only a Reservoir of a Slimy fluid secreted by the surrounding Flesh, which is pressed out in Deglutition to facilitate the passage of the food. The Throat is lined with the same kind of Glands. According to Malpighi's Doctrine, the Liver & other Glands were only

were only compounded of these Simple Ones — In his Idea the little white & yellow bags resembling the grains in soft Soap, which are often Observed on the surface of diseased Livers, were only these Glands Obstructed & enlarged — Untill last Winter Dr Hunter says, he thought his Doctrine well supported — Ruysch, who was very curious in Injections, was Once of the same Opinion that the Glands were Follicular, & that from each Follicle there went out an Excretory Duct, which uniting with other Ducts composed One Common One, as the Porii Biliarii of the Liver — But afterwards he improved his injections, & then he thought that the Substance of the Liver, and all the Other Glands, was composed entirely of blood-Vessells branching differently in different Glands, and so forming a different kind of Parenchyma — In the most Minute Injections of the Liver which Dr Hunter has been able to make, there were always Interstices to be seen not filled with the Injection: notwithstanding this seems to favour the Opinion of Follicles, he is of Opinion that the Glands are entirely Vascular — All Anatomists allowed the appearance of Cryptæ or Bags in the Kidneys, but even these are proved to be curling Arteries — Mr Cruikshanks last Winter by injecting the Emulgent Artery not only filled the Veins, but the Secretory Vessells also, so that the injection fairly passed into the bladder, which proves beyond a doubt that Ruysch was in the right — Ruysch was of Opinion that every Gland was composed of an Artery, a Vein, & an Excretory Duct, that the Artery terminated partly in the Vein, & partly in the Excretory Duct, that the blood carried by the branches of the Artery was received by the branches of the Vein, and a Liquor secreted from it by the secretory Vessells, or branches of the Excretory Duct: so that the Gland contained the two kinds of fluids, the blood & the Liquor secreted from the blood: besides these Vessells in the Glands there must be Nerves, as the Mind has great influence over them

over them, which can only be by means of nerves; thus any one beholding a delicious morsel is said to have his mouth water, and the great quan: :tity of pale Crude Urine, Hysteric Women make at the time of the Fit, weeping &c. are sufficient proofs. Dr. Nicholls describes two sorts of Glands, the first he calls Glands from Structure, the second he calls Glands ex officio, as a branch of an Artery opening upon any parti: :cular part; these are the same as the Exhalant Arteries. We shall just mention some particularities which may be observed in differ: :ent Glands: First Glands differ in form, some appear to be an uniform mass, such are the Conglobate or Lymphatic Glands, others appear to be made up Clusters of these joined together by Cellular membrane, & are called Conglomerate Glands, such is the Salival and Pancreas, secondly they differ in Substance, some Glands when cut thro' appear to be wholley made of the same kind of flesh, in others there appear to be two kinds of flesh, as in the Kidneys, the one kind is call'd Parenchyma, the other the Tubular part; thirdly they differ as to the course of their Blood Vessells, in some Glands there is but what we may call one Center of Ramification from whence all the small branches seem to proceed as in the Kidney, others have two as in the Liver, one for the branches of the Vena Portarum and another for the Veins going to the Cava: and here we may just observe that the small branches of Blood Vessells never anastamose with each other in the Glands: fourthly they differ in respect to their Excretory Ducts, some Glands, as the Liver have but one, some have many, the Breast has at least thirty which open upon the nipple. The Excretory Ducts for the most part regularly ramify like the Blood Vessells, but in some Glands, (the Breast for example) they ramify very irregularly becoming less & less as they approach the nipple. Some of the lowest of these Tubuli are so large within the Breast as to serve as Reservoirs for the milk which can be press'd out at pleasure. The last difference

we shall

we shall make in Glands is, that Some Glands have a Bag, or Reservoir to contain the fluid secreted by them, Some have it situated close to them, as the Gall Bladder is to the Liver, Others have it at some distance, for example, the Urinary Bladder from the Kidneys, while several Glands namely the Salivary, the Pancreas have none at all — A Variety of Opinions have arisen on the manner in which the Glands perform their Office, for a long time it was supposed to be done by straining, till the Moderns accounted for it in different Ways, Some of them thought it was done by Filtration, others that it depended on a particular Size & figure of the Secretory Vessells made capable of receiving particles only of a figure corresponding with these Vessells, as Triangular, Quadrangular &c — But according to these Theories, the Glands must be all soon obstructed — There are two general Opinions at present among the Moderns, the first is, that the different Secretions are only strained from the blood, that is, they before existed in the blood — For example they say Milk is nothing more than Chyle, which is carried to the Breasts & obtained from the blood, but changed in its nature & properties — The Mechanical Physiologists have embraced the first of these opinions, the Chymists the last. Dr Hunter says he was taught to believe that they all existed in the Blood, & were only separated from it, as many things commonly allowed as Facts seemed to prove, such as Milk was only Chyle, which was contained in the Blood in greater quantity after a Meal, & blood drawn at this time will be found to have its Serum white like Milk: that Animals living upon Vegetables will have their Milk acescent, but that on the other hand the Milk of Carnivorous Animals never sours, but becomes putrescent — To prove the truth of this last observation, Mr John Hunter fed a Bitch with flesh & water only for several days together, & he found that her Milk grew sour as soon as the Milk of those Animals that feed entirely upon Vegetables — Dr Hunter believes that there is in most Glands not only a straining of a fluid from the blood, but as the Chymists term it

To Hotton Lines

The Glandular System

term it, there is a Decomposition of the Old materials, & a new Assemblage of the new. He supposes that our Secretions are of two kinds, first that those Secretions, which are Excrementitious or to be thrown out of the body are only strained from the blood, which is all that seems necessary for their passage out of the body; but that the Recrementitious ones, or those which are to be retained, & again mixed with the blood, are not only strained, but also changed in their nature & properties. This is an animal function, we shall probably never comprehend. We can easily perceive mere Seperation to be made by supposing the particles of diff:erent Sizes in the blood, which may be strained thro' Vessells of different Diameters, & where the large particles are wanted, the Smaller may be carried off by Vessells appointed to receive them, & again be mixed with the mass of blood. Some have imagined that the Secretion of the Glands depended upon the Attraction of One fluid to Another of the same kind; that our Maker has originally impregnated our Glands with the same kind of fluid it was destined to secrete, which would admit no particles, but those of the Same kind thro' it, as we Observe Paper oiled will not let water pass thro' it's pores: Others that it was a particular Attraction between the Solids & Fluids, that Glands which were of one Density, could not attract fluids of the same Density. The Change whatever it is, we are unacquainted with, we can no more imitate it than we can the Circulation, so that as Dr Hale supposes, there seems to be someth:ing upon Life. We may Observe in general on Glandular Secretions, that there may be a previous preparation of the blood for that purpose, as appears from the Vena Portarum performing the Office of an Artery in carrying the Blood to the Liver. The next Step is the actual Seperation, the next the change produced in the fluid, & the next the carrying it to it's proper Receptacle by the Excretory Vessells. There is also absorption from the Glands, and as Dr Nicholls has Observed, if we blow

The Glandular System

if we blow into the Excretory Ducts of a Gland (the Pori Biliarii of the Liver for instance) we shall fill the Lymphatics. In health the Secretions seem to go on pretty regularly, Some are only made at particular times, or else they are greatly increased as that of the Milk in Women that are with Child, or give Suck: and we may next observe, that in proportion as some of the Secretions are increased, others are diminished, this is most manifest in the Secretion of the Excrementitious part of the blood, for example, let a Person drink a large quantity of Water, that Water is carried into the blood, now if the Weather and Body be warm, the greatest part of that Water will pass off by the pores of the Skin, but if the Weather and Body be cold, the greatest part will run off by the Kidneys. Irritation from external or internal things, as sand in the Eye or violent Affection of the mind will variously affect the Secretions. Some Medicines act indiscriminately in increasing various Secretions, which may in a great measure depend on particular Circumstances, others will act generally on some particular One, as Diuretics on the Kidneys. The last Observation we shall make is, that the motion of the Glands, particularly varied motion increase the Secretions.

The Nervous System

Lecture. 8th

We have already described the Vessells, which carry a Nutritious juice thro:
:ughout the body for it's support; also the Vessells which bring it into the
road of Circulation together with the Absorbing & Seperating System — these are
parts which Vegetables possess in common with Animals, but there is another
which Animals alone are endowed with owing to Sensation & Motion — This
System is the least understood of any in the body, indeed if we understood
it perfectly, we should know the Nature of the Union between the Soul & the
Body. The Brain the Source & Soul of this System is a Substance of a very
particular Nature, contained in the Cavity of the Skull, it has an appendage
or continuation of it's Substance out of the Skull, called the Spinal marrow —
That part of the Brain which the Skull contains is called the Encephalon
and is divided into three parts — the Cerebrum which is by much the largest
the Cerebellum, & Medulla Oblongata — The Brain is covered by two
membranes or Coats, the outermost is a tough, tendinous Substance, pretty thick
and (having but few Vessells, that carry red blood,) appears white, it's inner
Surface is Smoothly polished, and lays loose on the Pia Mater; it's outer
Surface adheres very firmly to the Skull, it is called Dura Mater; &
within this is the Pia Mater so called from it's tender make, it's outer
Surface next the Dura Mater is very smooth & has the appearance
of Sattin, next the Brain it is very rough and full of processes
that insinuate themselves between the Convolutions of the Brain, & are
every where attached to it — This membrane is very Vascular especially
on it's inside — These two membranes were called Dura & Pia Mater
because all the membranes in the body were supposed to be derived
from them — The Substance of the Brain is very tender, & exceeding
Vascular, it is of two different Colours, the outside called the Cortical part

is of a brown

The Nervous System.

is of a brown, the inside called the Medullary is of a whitish colour — the Medullary Substance of the Cerebrum & Cerebellum run together & form the Medulla Oblongata, which continued makes the Medulla Spinalis, so that the Spinal Marrow is only a continuation of the Whole Mass; it is from this Medullary part of the Brain that all the Nerves are formed. The Nerves are the Instruments by which the Communication is kept up between the Mind and the body, they are strong, white Cords arising from the Brain & it's Appendages, and branch to all parts of the body: It is a common Opinion that the Nerves are a Continuation of the Medullary Substance, and that the Coats of the Brain are continued over them as a covering. If we endeavour to trace the Nerves from their Origin, we shall find, particularly in the Spinal Marrow, that they arise by separate threads, and in passing thro' the Coats of the Medulla Spinalis unite into strong Cords. In endeavouring to trace them upwards, we lose them in the Medullary Substance, so cannot tell, whether they arise from the fore, back, or Middle part. Anatomists suppose the Nerves originate in the Opposite part to that where they came from decussating one another, because it has been Observed Hemiplegia happens to the right side of the body, when the Injury is done to the left side of the Brain, & Vice Versa all the Cases Dr Hunter has seen confirm this Doctrine. Anatomists suppose that the Medullary Substance is the Same all over the body, & that the Continuations of the Coats of the Brain form their Coverings, but this can be Only traced in the Optic Nerve. The Nervous Filaments which arise from the Medulla Spinalis, unite and form larger Nerves, as was said before; it appears that a Number of these Nervous Filaments are not only united in one common Coat or Covering from the Dura Mater, but each particular filament has it's proper Coat. The Nerves are very strong, and their Strength consists in this Covering. Some of the

Nerves

nerves are very small, and others very considerable, they branch in a regular manner becoming smaller & smaller, & are distributed to every part of the body. Every Nerve that we can trace appears evidently to be composed of a number of smaller nervous filaments, these filaments are very easily seen, and seperated in the Cauda Equina. The Filaments of the constituent nerves have been supposed not to exceed the 3000th part of an Hair in Diameter. From many Arguments to prove their amazing Small:ness, we shall only mention one, which is that every nervous filament appears to have it's own peculiar sense of feeling, & therefore every point of the Skin has it's distinct nerve forming a distinct thread from beginning to End, & therefore every point of the body has a nervous thread running to the Brain. The Nerves always rise in pairs from the Brain every part of the body has it's pair of Nerves: We may suppose the body to be divided by a mathematical Line, passing down the middle of the Head & Spine perpendicularly when the body is erect. People, who have an Hemiplegia will exactly describe this Line, saying that from the middle of the Nose, Forehead, & other parts of the face, to the middle of the hinder part of the Head on one side, they are cold, & on the other side they are warm. They generally run with the Blood Vessells, but not from their beginning at the Heart, because they take their Origin from a different part of the body, they meet with them in their course, thus those of the Arm join with the Artery of the Axilla, and the great Nerve which runs to the Thigh & Leg comes from the Os Sacrum, passes down the back part of the Thigh, & joins the Artery at the Ham. They also ramify somewhat like the Blood Vessells, but their ramifications are only Seperations of the larger nerves into smaller. The branches of the nerves intermix with each other somewhat Analogous to Anastamoses in the Blood Vessells, which is called the branching of the nerves, or the

communication

communication between them. When great Numbers of these branches run together in all directions similar to the Net-Work or ramifications of the Blood Vessells, they are called Plexuses. In most parts of the body the Nerves ramify like the Blood Vessells, but in the Viscera they run in a different Manner not entering them by separate Trunks, but in the form of Plexuses, which is very particular, for this reason their Nerves are not so well understood as in other parts. We may observe in general of the Nerves, that they do not vary their course in diff:erent Subjects near so much as the Blood Vessells. We are next to consider the Ganglions; the Word Ganglion is used in two different Sens:es, in a Chirurgical Sense & in an Anatomical One. In a Chirurgical Sense it means an Encysted Tumour on a Tendon, commonly containing a glareous fluid & is a disease; in an Anatomical Sense it means a little Lump or Swelling of some particular Nerves, and is a Natural appearance. Ganglions are very conspicuous on the Nerves of the Viscera, the largest in the body is found on the first Cervical Nerve; they abound in the Intercostal Ones. The Structure of the Ganglions has not been made out in a Satisfactory Manner. There have been two opinions concerning this, and their Use. One, that a Ganglion was a Compages of Muscular fibres to contract upon the Nerves, and thereby affect the Nervous faculties; the Other, that it was a little Appendix to the Brain, serving to produce fresh Nervous filaments, which is quite idle. They contain a great Number of Vessells, & appear when injected to be almost wholly Vascular. N.B. It is not adviseable to open the tumefied (or Chirurgical) Ganglions, it commonly produces much fever and inflammation, and the Wound heals up unkindly; if left to themselves after a time, the Skin that encloses the glareous fluid, becomes thinner & inflames & is painfull, & they burst into the

Cellular

The Nervous System

Cellular Membrane, the fluid or Matter is absorbed & the Patient does well — A small blow on the Ganglion; if it is sufficient to burst the Cyst, will almost always effect the Cure — We are next to consider the Use of the Nerves — The Nerves are the Organs of Communication betw=een the Mind & the Body — They serve two purposes, first to bring knowledge to the Mind of what passes without the body, hence our Ideas & Perceptions; and secondly to be the Means by the which the Mind and Body are united, serving to raise Ideas & Perceptions in the Mind; and to transmit her Commands throughout the Body — To Establish what has been said it is necessary to mention some Facts: that the Nerves have a Communication with the Brain is plain from this; if the Optic Nerves of an Animal are cut, he is deprived of Sight, if the Sciatic Nerve be cut he cannot walk nor feel in that Limb to which the Nerve is sent; because it has lost its communica=tion with the Brain, and the same effect will follow if the Brain be pressed on in the part whence the Nerves came, for the part to which these Nerves go will lose its feeling & power of Motion, as is the Case in an apoplexy from an extravasation of Blood in the Brain The common Opinion is that there is a Sensorium Commune lodged in the Brain, but some on the contrary have imagined that the Mind is not confined to any part in particular, but diffused thro' the whole body — It seems most likely that there is a Sensorium Commune for upon cutting a Nerve in any part, that part becomes Paralytic which is below the division, which would not be the Case if the Mind was diffused all over the body — Another Fact seems to prove this, every part of the body has its proper Nerves, now when a

Limb

Limb is taken off, the Corporeal frame is not entire, yet the Mind is, and if from any cause the End of those Nerves which were continued to the Extremity of the Limb before it was cut off should be disagreeably affected, the Patient feels a Sensation, similar to that he would have felt in that particular part, where those Nerves terminated when the Limb was not taken off — The knowledge we recieve by our Sensations is not innate or born with us, but is acquired by experience for example, a young Child runs its finger into the flame of a Candle, it feels the pain, but knows not the part hurt, & will again apply its finger to the flame, till he finds by Experience that it is hurtfull; so also in a grown person, the particular part that is affected in all deep-seated pains, he cant point out, because not seeing them, he cannot tell by Experience where the pain lies — Irritation upon the Nerves produces very irregular & involuntary Motions of the Muscles, and Convulsions — Some Anatomists have asserted that as there are two functions belonging to the Nerves (that of conveying knowledge to the Mind, and that by which the Mind acts on the body) one of these functions may be destroy'd and not the Other; for example they say a Case sometimes happens, in which Muscular Motion or the free Use of a part subsists entire, and yet all feeling in that part shall be utterly destroyed: On the Other hand that sometimes the Sense of feeling shall remain unhurt, yet the Motion of that part shall be entirely lost — Dr Hunter thinks it may be justly doubted (as every Nerve appears to have its peculiar Office) whether in the first all the Nerves of that part were destroyed, or only those appropiated to the Sense of feeling, and in the other Case whether those Nerves which serve for Muscular Motion were

not the

The Nervous System

not the Only ones lost, or rendered useless — Physiologists have made mention of another Phænomenon in the nervous system called Sympathy between the nervous Affections; thus a Person taking a pinch of Snuff irritates the inner membrane of the Nostrills, and immediately the Muscles serving to Respiration are irritated, so that they produce a violent expiration to throw off the Offending Matter, by passing thro' the Nose the breath dislod:ges the Snuff from the irritated part, and Sneezing is caused to ensue — this Sympathy of the nervous Affection has been accounted for by saying there is a communication between the Nerves of those parts which sym:pathize with each other: this Opinion is now however given up. One great Objection to it is, that there are so many communications between the Nerves of different parts, that was Sympathy to be occasioned by the above cause, there would be such a Variety at the same time as would create confusion — At one time in France it was accounted for from juxta:position, that is that Sympathy was occasioned between two parts, which had the Nerves arising from the same part of the Brain but this appears to be by no Means the Case — According to the plan laid down, we should next proceed to explain the principles of Action which subsists between the two Systems by Means of the Nerves, or in other Words to explain the Mode between the Soul and Body, but this we are entirely ignorant of — Some have supposed that the Brain was a Gland that secreted a liquid called Animal Spirits, & that the Nerves were the Excretory ducts, that this fluid was thrown from the Brain to produce Motion in any part, and that it was thrown from the parts on the Brain to produce Irritation: Others suppose them to be Solid Cords, and that they were acted upon as the strings of a Musical Inst:rument are by Vibrations being excited — We should

remember

remember a very great discovery that has been made of late Years, that of Electricity, which has led us to the knowledge of many surprizing Phaenomena. Suppose the Maker of an Electrical Machine shews it to a Man entirely ignorant of it's Nature, who never heard of Electricity, how would he reason concerning it? he sees the Machine wound up, & he receives the Shock; why he says, tho' he is ignorant of the Structure of the Machine, he is convinced it acts upon Mechanical principles, because he has no Ideas of powers Sup:erior to those; for the same reason he explains the Stroke from the Torpedo, or Numbing Fish upon the same principle, which is now proved to have an Electric Matter lodged in it; Just in the same Manner some endeavour to account for the principles of Action between the Soul & Body; It appears to be effected by Powers altogether unknown to Us, exceeding different from all Mechanical Ones, and of which it is highly probable we shall always remain ignorant —— NB. The Arm has five principal Nerves and a short One that surrounds the Articulation of the Shoulder ——

Having now considered the two great Systems, the Vascular & Nervous, we shall next consider the Cellular Membrane —— ——

The Cellular Membrane
Lecture 9th

This is the soft connecting medium between all parts of the body uniting muscles, Vessells, nerves, Bones &c in short all the several parts together. The Cellular membrane in some parts contains Fat, as that under the Chin &c. but in other parts as the Eye Lid, Scrotum &c it does not, whether it contains Fat or not, it is every where ductile, & tho' connecting two parts, it suffers them to move with ease. Every thing in the Body adheres by this Substance, call'd by Anatomists by three different names, the Cellular, Adipose, & Reticular membrane; If we take a piece of it which contains no Fat, blow it up and dry it as a piece of the Scrotum for example, it appears to be a composition of fibres, & little membranes forming a very light net-work, with Interstices between them called Cells, by blowing it up it is true it is enlarged, & by having its Interstices stretched and made bigger by several of the fine fibres being broken thro', it appears more porous than naturally it is, & by drying the fibres they lose their bulk considerably & seem lighter. When viewed in a wet preparation or as it is in the body, it seems to be a much closer net-work composed of fibres exceedingly minute, & the Interstices between them very small indeed. The general opinion is, that it is a net-work because it is porous, and that it is Cellular, but Cellular is rather a bad name, because it conveys the Idea of a Cavity every where surrounded. Reticular is a better, & more expressive Appellation than the former, & the Term Adipose will do for that which contains Fat, but not for all; it may be necessary to retain all the three in describing its appearance in the several parts of the body. When speaking of it generally, or altogether, we will call it Cellular, and that Species of it which lies under the Skin, and contains the Fat, we will call Adipose; where there is no Fat, as in the Eyelids & Scrotum we shall call it Reticular membrane,

thus we

thus we shall say that in the Penis it is Reticular, and the parts surrounding the Rectum, that it is Adipose. We must conceive in our imaginations that the Stamina of our bodies is inorganic, for instance if we examine the coat of an Artery, we shall find it still composed of still smaller Vessells, and these probably of others still smaller, yet we should conceive that we must at last come to a portion of Matter inorganic or not composed of Vessells, but these are so exceedingly small that they cannot be examined, therefore it is best to consider every part of the Body as entirely organic or composed of Vessells. The Cellular Membrane is made up of a Mixture of Arteries, Veins, Lymphatics & Nerves scattered all over it: it appears to have but few Vessells that carry red blood, the far greater part carrying only Serum in their natural State, but as we have Observed before these Serous Vessells may by inflammation be made to carry red blood; that the Cellular Membrane and particularly the Adipose is exceeding Vascular, we can demonstrate by filling the Vessells with a Vermillioned Injection, so that it appears all over red. Haller supposed that the praeternatural adhesions which were formed in the body in consequence of inflammation are inorganic, for example in the Peripneumony & Pleurisy, when the infla:med parts throw out a Mucus which makes adhesions, that they were not composed of Vessells, but these Adhesions formed according to Haller from Mucus thrown out from the inflamed Vessells Dr Hunter finds in the Cellular Membrane, and so far from being inorganic they are exceeding Vascular; indeed when a new Substance is to be formed in the body, Nature always makes it shoot in the form of Vessells: the very Callus that cements a broken Bone, & a Cicatrix are very Vascular, and may be minutely injected. Every part appears to be organic, the blood which produces the Wain our parts, Mr John Hunter has found will have Vessells formed within itself. The Cellular Membrane then may be said to be a composition of thread, or little Strings so weaved together in a kind of

kind of Network, as to leave Interstices between them, & these threads are entirely composed of Vessells — It is universally scattered throughout the body connecting all parts that have adhesion together, it unites the Skin to the Muscles, the Muscles to each other, it covers not only the Muscles in general, but every fibre of a Muscle in particular, it pervades all parts of the body, to an inconceivable degree of Minuteness, in short it is the universal connecting medium throughout the body — Dr Hunter says it constitutes at least one half of the body, & he believes much more — Many Anatomists called that Stratum round a Muscle, membrana Communis Musculorum, but this need not be particularly called membrane; and they call the Cellular membrane surrounding an Artery & Vein, the Cellular Coat, but this we have rejected — Let us now consider the Appearances in some diseases as far as they regard this Substance — In the first place we would Observe that the pores & Interstices of the Cellular membrane communicate with each other and that they are always naturally a little moist — We may easily conceive a redundancy of this fluid may happen from various Causes so as to fill the Interstices, & form what is called Anasarca, or Leucophlegmatic Dropsy; in this disease the Legs & Feet first begin to swell of a Night, but in the morning the Swelling is Abated, because all the Interstices communicating with each Other the Water by it's Gravity tends to the lower parts which are the Legs & Feet when the body is erect as it commonly is during the day, & when the body is in an horizontal position, the Water will return in great part from the Legs to the Trunk, & thence it happens that in the Morning the Swelling in the Legs is less; as this Redundancy increases, the Swelling runs up to the Trunk, Arms &c till it overflows all the Cellular membrane the Interstices being full the Skin will have the feel of Dough or Sponge, & by pressing on it with the Finger, the Water is pressed into the Neighbouring Cells, leaving a pit which disappears gradually as the Water returns.

By these

The Cellular Membrane

By there being a Communication of Cells we see the reason why Scarifications let out this Water, and as the Water makes its Way thro' the several Cells but gradually, we find that it does not flow thro' the puncture in a stream but oozes out very slowly. The Watery Interstitial fluid has sometimes been found changed into a Gelatinous Substance, the reason of which is not known. In the living body other fluids may be thrown into the Interstices, and will run thro' them as the Water does, — Blood for instance may be extravasated from a ruptured Vessell under the Skin into the Cellular membrane, & often makes a black mark of considerable extent; this is particularly the Case from a black Eye, the Cellular membrane of that part being of a very loose texture. A Man was taken into St. George's Hospital for the puncture of the Artery in bleeding, the Person that bled him had by compresses stopped the Bleeding outwardly, but the blood had got into the Cellular membrane of the Arm, making the appearance of a blood pudding; there was so great a quantity of blood thus lost out of the Vessells, and the man so weak in consequence of that loss (tho' still within the body) that he died the next morning, for the blood being gone out of the road of the Circulation might as well have been out of the body. As Water & Blood may be accumulated & extravasated in the Cellular membrane, so likewise Air may. There are two Cases principally in which we see this Collection of Air in the Cellular membrane, the first & most common one is Mortification; in this disease the Limb often becomes puffy with a springy Swelling from the putrefaction letting loose a quantity of fixed Air, which getting into the Cells is supposed to occasion this appearance, & indeed this appearance may be considered as a sure mark, that the mortification will spread farther if it arise above that already mortifyed; for we may be certain that a mortification is not stopped, if the Limb becomes

still more

still more Emphysematous: the other case is, when People have a penetrating Wound into the Lungs or Trachea; and this appearance is a certain Sign that a Wound has penetrated the Cavity of the Chest & wounded the Lungs; if a Wound penetrates the Chest & the Lungs are wounded, the Air that passed into the Lungs by Inspiration finds a passage thro' the Wound into the Chest in Expiration, and would pass out thro' the external Wound if it were big enough, but this commonly being small the Skin prevents the Air from getting out, & obliges it to pass into the Cellular membrane where it makes a Swelling as before described, at first only round the Wound in the Skin, but as the same thing happens in every Expiration the Swelling is increased till it at last overspreads the whole body, this is called Emphy:sema; the Skin when handled makes so remarkable a crackling Noise, that a Person who has once noted it, cannot be afterwards deceived. Dr Hunter related the Case of a Man at Limehouse, who had an Emphysema from the Spicula of a broken rib having wounded the Lungs, it extended all over the body, which was thereby quite out of form, and sounded like a Drum if tapped upon, his Eyelids were closed, & his Scrotum swelled to an Enormous Size, in short he resembled a Skin blown up more than a Man; he was relieved by making an incision on the broken rib thro' the Skin to give free passage to the Air from the Lungs, & by pressing the Skin with their hands oiled towards the part, the Air was pressed out from the other parts of the body, just making a puncture or two in the Scrotum: when the incision was first made in the Skin; the Air rushed out as Air does from a pair of Bellows compressed. Abscesses, which are always Observed to be found in the Cellular membrane are not supposed never to happen in Muscles for they certainly do, but then it is in the Cellular membrane of the Muscle or of whatever part the Abscess is seated in, so that we may say, that this Membrane is the Receptacle of Matter, and general Seat of an Abscess. It may be asked, why does not Matter diffuse itself all over the body in the same Manner as Water or Air does when

does when extravasated in the Cellular Membrane. To this it may be answ:
:ered, that Collections of Matter are always preceded by inflammation, & it is the Nature of inflammation to unite parts, so that all the little Surfaces where the Inflammation spreads are glued together making that part of the Cellular Membrane hard & compact, thus when blisters are applied to Drop:
:sical Legs, & by that means the Cuticle removed, the true Skin may be comp:
:ared to a Wet Cloth, which suffers the Water to drip thro' it, but when from irritation an inflammation comes on, no more Water will ooze thro' it. Matter in an Abscess by following the Course of the Cellular Mem:
:brane will dissect parts, as if done with a knife. We observe it always endeavours to make it's way to the most depending parts, because its own gravity assists it's descent, & it always points outwards because, as other fluids, so it presses equally every way, the bones & other internal parts make most resistance to it's progress, and therefore it is disposed to point towards the Skin, but in a Pleurisy that has terminated in Suppu:
:ration, if there be adhesions of the Lungs with the Pleura, the Matter meet:
:ing with great resistance from the Intercostals, Ribs & Integuments, will make it's way into the Lungs & be expelled by them, generally however proving fatal by bringing on a Pulmonary Consumption. The reason why Cicatrices of Wounds that have been open for a length of time, are hollow, hard & tucked down to the bones so as to be immoveable is this, because the long continued inflammation necessarily attend:
:ant on the Wound consolidates the Cellular Membrane, makes it hard & no longer ductile, as we see is the case in those parts where Issues have been in the Arm, & where Scrophulous Ulcers have healed. We shall now consider the Adipose Membrane. It is the general Opinion that the Adeps or Animal Oil when seperated from the blood is lodged in the Cells of the Cellular Membrane, but Dr Hunter says, he is very sure that it is not lodged in those Cells, where Water &c is sometimes collected; but that it is lodged

lodged in little & seperate bags which do not communicate with each other, for if we press on the Skin & by that means on the Adipose Membrane, we do not find the Oil recede into the surrounding Cells, as water does in the Reticular Membrane, & it is Observed that in some parts, the Eyelids & Scrotum for instance, there is never any Oil seen, but water is often seen here; so that besides the Reticular texture there are bags containing Oil, strained off from the bone, & deposited in them which is taken up again occasionally: If a hole be made in the Cellular Membrane and Hogs Lard be injected into it, while it is kept fluid it may be pressed out of some Cells into Others, as Water may, which shews that the Adeps is deposited in that part only of the Cellular Membrane, that is fitted to receive it — This Oil has different consistence at different periods of Life, and in different Animals — In an Ox it is firm, called Suet, in a Hog it is a soft axunge, similar to which is the Human Oil — In a Foetus there is no Fat, at least not in a Young One — the first fat we have in our constit:ution is immediately under the Skin & there alone — In young Children there is commonly a great quantity of it under the Skin, & hardly any in the Other parts of the body, but as we grow up it is more equally distributed, the proportion of that under the Skin diminishing as the quantity of it in Other parts increases, and as this Oil is exceedingly troublesome in dry preparations, by the moistness it occasions, we generally chuse young Subjects for this purpose — In the body there is always to be found some Oil after Death, except in one case only, the inveterate old standing Dropsy, such a Subject is very proper for a dry preparation — In general we may Observe that ease of mind and Body with good food disposes People to be fat & Vice Versa. Dr Hunter says he is sure from experience, that being fat depends in great measure upon the Mind; People of an Anxious temper & great Sensibility who exercise the Mind much are never fat — One great Use of the Cellular Membrane has already been explained, which is to

unite all

unite all the parts in such a manner as to allow them to move upon one another with freedom whose motion is required, in some places it serves as a cushion of defence to the parts underneath from pressure as on the Buttocks & Soles of the Feet where considerable pressure is applied & therefore a great quantity of this Substance is provided — almost all Writers on this Subject speak of its serving to fill up all the Interstices of the Muscles, & thereby to give a more beautiful form to the body, but it is probable our Maker consulted the Use and not beauty, when he gave us this uniting medium — Another great Use of the Cellular Membrane is to serve as a Reservoir for the Animal Oil, which is supposed to be wanted for some purpose in the Constitution; Suppose in a full grown Man 40 pounds of it was wanted for the animal Oeconomy, we may admire the wisdom of the Creator in not lodging it in One Bag or Reservoir in any part, for as it is now placed it serves as a case or covering to the body to defend it from cold, which appears to be the reason why fat People bear cold better than lean ones, the sole diffe:rence in them consisting in the fat alone, the Muscular fibres & other parts being alike in both — The last Use of this Animal Oil that we shall mention is, to keep up an equality of Nutrition — In its Nature it appears analogous to the Expressed Oil of Vegetables, — In our bodies nutrition goes equally on whether we eat much or little food, hence when our diet is too scanty, part of the Oil is Absorbed to make up the deficiency and we become bare — Instances are not wanting of persons who have lived ten or twelve days without food, being all that time supported by this Oil Only — —

Lect 10th

The Muscular System

Lecture. 10th

Besides what have already been described, there are in the body Organs of motion having their functions produced from an internal cause, & these Organs are call'd Muscles, of which we will in the first place speak Anatomically and then Physiologically — A Muscle means a mass of thready flesh, or bundle of threads which are easily seperated from one another, and in a living body shorten themselves to produce motion — Some of the Muscles are under the command of the Will, & some are not, those which are, under such command are call'd Voluntary muscles, those which are not, are called Involuntary Ones — It is commonly thought to be a discovery of the Moderns, that there are some which are voluntary, & some which are not — Galen & all the Greek Writers define them Voluntary, & say that the Heart, over which they observe the Will had no power, is no Muscle; indeed the Heart perhaps may be a different Organ, & have an action different from a Muscle, for it acts incessantly without tiring — From observing the peculiarity of this part Galen might very easily conclude it to be no Muscle — The prin:cipal part of a Muscle is composed of threads so fine, that they cannot be traced singly; these fibres in different Muscles are collected differently & bound together in Fasciculi or little bundles by the Cellular membrane, all the Muscles then are made of a number of fibres connected with One ano:ther in Fasciculi by means of the Cellular membrane, & with more or less fat upon their Surfaces, & in the Interstices of their Fasciculi as the Animal is fatter or leaner — This division of fibres descends to an inconceivable degree of minuteness — Some have supposed every fibre of a muscle to be a String of bodies like beads in Shape; but as the constituent fibres are so small as not to be seen distinctly with the best Microscopes, it is impossible to know what they resemble; We find in

a muscle

a Muscle, Arteries, Veins & Nerves, their red Colour depends upon the blood in the Vessells, for by frequent Washing it may be almost all got out, & the Muscle will then appear as white as fat, hence the difference of their colour in different people — The quantity of blood carried to a Muscle does not seem to be entirely for it's nourishment, but Muscular Motion also seems to depend thereon — If a Limb be cut off that has been long useless, hardly any Muscular flesh is to be seen in the Stump, for the Limb is shrunk, & whiter than one which is constantly in Action, which makes it evident, that blood is carried to a Muscle in proportion to it's Action — The blood Vessells of the Muscles are very numerous, the larger branches commonly run deep in the body, of the Muscle in every direction, having no Center of Ramification as in Glands — Besides the fibres of a Muscle visible in their collected state and the blood Vessells, they have Nerves which commonly run with the blood Vessells — It was a common opinion, that a Nerve deposits its covering which it has from the Dura Mater in the part to which it is distributed, & that the Nerves on this Account were soft & pappy in Muscles, but this is a mere Hypothesis, for as we can trace them in a Muscle they are as firm as in any other part — It appears that some Muscles have a greater quantity of Nerves than others, & this in proportion to their size, which has given rise to an opinion, that the Nerves are distributed in proportion, as the Muscles are more or less designed for Action, for example, the Eye is said to have a greater Number of Nerves than the Arm, which last is not so constantly in Action as the Eye, but on the other hand, the Heart, which acts the most frequently & constantly of any Muscle in the body, has not so many Nerves in proportion to its bulk as the Eye — Lastly in the structure of a Muscle, we must suppose that there are a great Number of Lymphatic Vessells, tho' we cannot well distinguish them, it being only surfaces commonly, on which we can find them so as to shew them plainly — We shall next consider an Appendage to the Muscles,

the Tendon

the Tendon; According to the Old Doctrine a muscle was divided into two parts, the Belly, & the Tendons. The Tendons were supposed to be composed of fibres running in the same direction as those in the Belly of the muscle, & connected together by Cellular membrane as that is. It was farther supposed that the number of fibres were the same in the Tendon & Belly that one continued fibre ran the whole length of the Belly & Tendon, but thicker in the Belly, as having more Arteries, Veins, Nerves, & Cellular membrane than in the Tendon. Tendons are inelastic Cords composed of fibres running lengthwise connected together with Cellular membrane, found to be Very Vascular by injection, but have only few Vessells that carry blood, & but few Nerves. It was a common Opinion that as we grow up, the muscular fibres shorten, & the Tendon grows longer; but this is not true, indeed a thickness or gumminess may be Observed about the Joints of young people, which depends entirely on the Cellular membrane. The Opinion of the fleshy & Tendinous fibres being the same continued Ones, so that the number of them in the Tendinous & fleshy part is equal, appears to be ill grounded, for the Tendinous fibres & fleshy Ones are differently arranged in the same muscle in some parts, as in the Temporal muscle for instance. Dr. Hunter says, that he is convinced that the Tendons & muscles are distinct Substances, as the muscles & Bones are. The Tendons have no power of contraction they may be considered merely as Chords fixed to the muscle; nature, to answer some particular purpose, having made use of an agent betwixt the moving power & the power to be moved. Some muscles have no Ten:dons, because there is no occasion for them. The Use of the muscles is next to be considered. A muscle acts simply by shortening & lengthning itself, by shortning itself it moves the part it is attached to either immed:iately with a Tendon, or immediately without One, it's contraction depends upon the muscular fibres alone, the Cellular membrane only serves to unite the fibres together, the blood to nourish it & perhaps something more, the

nerves not

nerves not only serve for sensation, but also bring the power for moving it, the Tendons serve as Chords to unite them to particular parts; it may be asked why were Tendons made & not the Muscular flesh conti: :nued on from one end to the other. The Ancients supposed they were made for the better uniting of Muscles to bones, that bone was of too hard a nature to admit a Substance so soft as Muscular flesh to be united to it, that a Tendon being of an intermediate nature between bone & flesh, was therefore the properest Substance to unite them, but had they looked on the firm Adhesion between some Muscles & bone without the intervention of a Tendon, they would have found this to be an Error. A Tendon being more compact than a Muscle, is used when Muscular fibres would have been too bulky & hindered the motion of the part, for instance it was necessary that the Flexor Muscles of the hand & fingers should be very strong, & as a considerable Mass of Muscular flesh would have been very inconvenient in the Wrist & Hands, the Muscles are removed at a distance, & Tendons made use of, which taking up but little room, freedom is allowed for Motion; For the same reason when a Muscle runs over a Joint, that part which moves upon a bone is always Tendinous. Tendon bear friction much better than Muscular flesh, which is another reason, why the belly of a Muscle never plays immediately upon a Joint. Some of the Muscles pervade the Bones, they only enter the Periosteum, some are united without Cartilages, & there fixed into soft parts, as the Tongue. Muscles may be divided into three different Classes, and these subdivided into Genera & Species. Of the first Class is the Oblong, the second, the Hollow Muscle, & the third may be called the Mixed Class, partly hollow & partly Oblong. Of the oblong Muscle there are many different Species, if all the fibres of a Mus: :cle were to run parallel to each other, it might perfectly be called a rectilinear Muscle, but as there is not an instance of this kind in the body, that which approaches the nearest to it is the Sartorius, and the Penniform Muscle is the one most commonly used in the body, of this there

are several

are several kinds, its fibres run parallel to each other, but Obliquely to the axis of the Muscle; the half Penniform has Oblique fibres on one side only as the Flexor Pollicis Longus, the two half Penniform joined as the Gastro:cnemius, or any number of them joined as the Deltoid – To consider the reason for which Muscles are penniform, they need only be explained up:on Mechanical principles, and we should always observe if the Phænom:ena agree with the Theory, if they do not, we may be assured that the theory however specious, is false – Those fibres whose Muscles are nea:rly rectilinear, will have a greater length of fibre than the Penniform Muscle, that is they will move a body farther than the Oblique Ones, but with much less Force – Muscles are called Radiated when their fibres run to a Center, as in the Diaphragm – The fibres of hollow Muscles have a variety of directions, in some they are regularly circular, as in the Intes:tines, in the Heart they form a kind of double Circle or figure of 8 – By the Mixed Class we mean those, which sometimes act as hollow Muscles, & sometimes like Oblong Ones, of this kind are the Abdominal Muscles, they act as hollow Ones when they gird the belly, & as straight Ones when they bend the body forward, – It has been common to call the End of a Muscle which is least moved its Origin, & the other end its Insertion, but as this may sometimes lead us into an Error, it will be better to speak of them by the general names of Attachment – Anatomists generally divide the Muscles into different Classes, but this division is neither regular, nor certain – Some Muscles had names given very early, but the generality were not named 'till after the time of Vesalius – They generally derive their names from their several uses, thus there is the Class of Respiratory Muscles, and this is subdivided into two, first those for Inspiration which raise the Ribs, and secondly those for Expiration – and of the Hand there is the Extensors, the Flexors, the Lateral Ones, & those which serve for Rotatory Motion – We should be particularly careful to distinguish

those

those Muscles which serve to the Motion of a part from those which lie on a part, for instance, the Muscles which move the Leg, lie upon the Thigh, and those which move the thigh, lie upon the lower part of the Trunk, likewise the Muscles which move the Forearm, lie upon the Arm. Authors not attending to this in describing Cases have frequently left us doubtfull of their mean:ings. The Appendage of a Muscle, a Tendon, we have already taken notice of, another Appendage is a thin Expansion of a Tendon called a Fascia; there is also another Appendage, a Pulley, as the Trochlea thro' which the Superior oblique Muscle of the Eye moves by its Tendon. Another Appendage still is made by the Annular Ligaments or Bridles to keep down the Tendons & prevent their starting up when the Muscles contract, as those of the Wrists; Lastly, there is the Sacculus Mucosus, which was discover'd by Dr Douglas, its Use is to prevent Friction, where a Tendons plays upon a bone, the end of the Tendon forms one part of the Bag, & the bone the other part; a large one may be seen under the Deltoid, where it plays upon the head of the Humerus —

The Muscular System

Lecture. 11th

Having now considered the general structure of muscles Anatomically, we proceed next to consider them Physiologically, to consider their action, that is, Muscular Motion as it is called -; In the living body, the action of a shortning, or an endeavour to shorten itself, this is generally the state of a muscle in action, but sometimes it is lengthned if during the time of its action, it is resisted & pulled out -, as a man having his arm by another, which he endeavours to prevent by the action of the Flexors of that part -, The action of all muscles depends upon their longitudinal fibres, that is, those which are peculiar to them as muscles, for whatever is said of transverse fibres, they are evidently nothing but Cellular membrane conn:
:ecting the longitudinal ones -, the action of the muscles as to the effect produced is very different in different muscles, as between straight and hollow ones, for instance -, the effect also will differ according to the direction of the muscle, thus the Trochlearis muscle of the Eye by means of the Pulley, draws the Globe in a direction different from the line of contraction the effect differs as the whole or part of a muscle only happens to act, thus the whole of the Deltoid acting will raise the Arm directly upwards, if a portion of it only is in action, the Arm will be pulled more or less to one side or other, or upwards, or downwards as the portion happens to be more on one side, than another, or on the Top - It has been a Question with some (and an idle one too) whether one part of a muscle can be in action & contracted, and another part of it relaxed & inactive at the same time; nothing may be more plainly observed than this partial motion in the Deltoid; one part of it shall be contracted & hard, while another part shall be relaxed & soft; that the Radiated muscles particularly act in one part & relax in another at the same time, is sufficiently evident too in the Pectoralis major - The effect produced by muscles in action will differ according to the state of the Joint they are to move; thus the Biceps Brachii when the hand is supine will bend the Arm, but when it is prone, the effect produced is different as

thus happens

there happens to be a co-operation or combination of the Action of other Muscles; thus if only One of the Mastoids be put in Action, the head will be pulled down on the Shoulder, but if both act at the same time, the head will be bent directly forwards; this co-operation or combination is greater in our bodies than one would imagine especially in the Extremities where a Variety of Motion is required in the same part, it is also infinite & makes our System of Muscular Action very complicated & hard to be understood. A Man that is performing the slightest action moves a great number of his Muscles. Muscular Motion, tho' it seems to be so very easy & natural to us to perform, yet is only acquired by Attention & Use. Children learn to use their Muscles by degrees, & it has cost us great Labour in learning how to perform many Actions with our Muscles, which now appear to be quite natural to us. When we consider the force of Muscular Action, we must make a distinction between their absolute & relative force. Force absolute is what a Muscle could exert independant of its Origin & Insertion; supposing a Muscle alone was to have a weight on one end & fastned to any thing at the other; the force it could exert to raise the weight will be Absolute force. Force relative is that with which a Muscle really does act on our Machine according as it is placed in the body with regard to Origin & Insertion; & this generally is greatly inferior to Absolute force. The Muscles are commonly inserted into the Bones near their Center of Motion, which makes them act at a disadvantage (for if a string be tied to that part of a Stick near its Center of Motion, it will require a greater force to raise a weight placed at the end, than if a string be tied farther off the Center of Motion.) but this disadvantage is compensated for by very great Advantages: the Muscles are strong enough to overcome this disadvantage, and the compact form of the body required them to be placed as they are, besides their Velocity is greatly encreased by it, as they only need move a little to produce their effect; thus the hand will move less in turning a Wheel around, if it be placed near the Center, than if it be placed near

placed near the Circumference — It is very evident that it is not Elasticity which produces Action in a Muscle — Let us examine a few of the Phaenomena observable in the Action of Muscles; first, a Muscle in Action grows hard in its Substance, & contracts in its length if the resistance does not equal, or overcome it; secondly some Muscles in Action will shorten themselves two thirds of their length or more, this can be proved in the fibres of the Stomach, Intestines &c — The Urinary Bladder in People that are hang'd will sometimes contract itself like a solid ball: thirdly, it is incontestable that the whole body of a Muscle does not grow sensibly bigger in Action, that is if it encreases in bulk, it decreases in length in the same pro:portion — Muscles during the time of their Action were said to grow pale, but this Opinion is now given up, to Observe this, Experiments were made on Vipers & other Animals where the Heart was observ'd at the time of its contraction to become pale, but it was not that the Muscular Flesh grew pale, but being thin & the blood being pressed out of it by the contraction, it was on that account paler than when it was relaxed & full of blood — It was a common Opinion that in living Animals, the Mus:cles were always acting, that the cause of contraction constantly existed & as an instance the Sphincter Ani was said to be always contracted if not over:come by some Cause, as the Faeces, & that the Flexors of the Arm in sleep are always endeavouring to bend, & the Extensors to unbend the Arm, thus by their opposite Actions keeping it in Equilibrium, but this Opinion is manifestly absurd — In the Voluntary Muscles motion depends entirely on the Will, that is to say, they do not contract with any sensible force, but only just enough to adapt themselves to the different positions of the Limbs — The Muscles have Nerves & Arteries distributed to them, & many Experiments have been made to ascertain their influence on the Muscles: every body allows that when a Nerve is cut thro, or tied tight all motion ceases in the part to which it is distributed — The same thing happens when the Brain is injured, to those parts which derive

their Nerves

their Nerves from that part of the Brain which has received the Injury. Irritations of the Nerves will produce irregular Motions of the Muscles or Convulsions. If we cut off the head of a Frog, & run a pin down the Spinal marrow, the whole body will be convulsed, & if we prick the Spinal marrow as it comes out from the Skull, the Muscles of the head will be convulsed also. To ascertain what share the Blood has in producing Muscular Motion Experiments have been made by tying the Crural Artery, but this experiment proves nothing, for there are a great many Anasta: :mosing & lateral branches. Paralytic Cases seem to prove that the arterial blood has very little influence on Muscular Motion; on the other hand, when the Muscles have been long useless, the Muscular fibres shrink their colour becomes whiter, & they lose in a great measure their Mus: :cular Appearance. We say that a Muscle is active when it contracts, & passive when it relaxes, and further the Heart is active in the Systole, & passive in the Diastole; but it appears that the Heart is active in the Systole & Diastole too, for if a Ring of the Substance of a Turtle's heart be cut out, the fibres will not only shorten themselves so as to contract the Circle, but they will likewise lengthen themselves so as to enlarge the Circle & this alternately. Numberless Theories have been invented to account for Muscular Motion. Some have supposed that the Action of Muscles was caused by a flowing of Spirits into them from the Heart: others that the Muscular fibres were a chain of Vesicles, & when in action were filled with Animal Spirits: others that the Vesicles of which the Muscular fibre was supposed to be composed were fill'd with Arterial blood, while the Nerves were supposed to act as Sphincter Muscles to prevent its entering them, when in an inactive state. Others have supposed that Muscular Motion was caused by an Effervescence between the blood & Animal Spirits. As we are entirely ignorant of the Structure of a Muscular fibre, it is impossible we should know what changes are produced in it by the Action of a Muscle, and it is highly

probable

probable, that Muscular Motion will never be explained. A Question has often been started, namely whether on this or that part of the body, the Uterus for instance, there are any Muscular Fibres — Those, who propose such a question, go on the supposition, that the Structure of all Muscles is the same, which may probably not be the case: for we may Observe a great difference in different Muscles, Some are Voluntary or Subject to the Will, these soon grow tired with Acting; Some are involuntary & these never tire, tho' their Action sometimes last upwards of an hundred Years; Others are both Voluntary & Involuntary, for instance the Muscles of Respi:ration, whose action, we can either accelerate or retard at pleasure, tho' commonly they act without the interposition of the Will — Of late Years Haller's Doctrine of the Irritability of Muscles has made a great Noise, but when he says no parts of the body are irritable, but the Muscles, it is plain that he only means, that no parts of the body contract from a Stimulus being applied to them, but the Muscles; this appearing to be, a property peculiar to the Muscular fibres, but great pain may be produced by stimulating parts which every One allows not to be Muscular.

NB — The most certain Sign of Death next to putrefaction is when all the Muscles of the body become stiff & rigid. —

Lect 19th

The Bones

Lecture 12th

The Bones differ from all parts of the body in hardness & inflexibility, every part of the body has some flexibility but the bones — On their external surface they are very compact, their internal part is spongy or Cellular — The compact part does not appear porous to the Eye, but by the help of Glasses, or if we examine bones that have been long exposed to the Weather, (whereby every thing in it that was not bone is destroyed) we shall find that they are full of cavities — these cavities are principally filled with blood Vessells, which proves the bones to be Vascular & to have a circulation thro' them thousands of Vessells run branching inwards into the bones & anastamose with the branches of Arteries sent to the marrow, which branch outwards to meet them — Most Authors agree that the bones have no feeling, it is impossible to determine absolutely whether they have nerves, or not, as we cannot colour nerves, nor trace them to any degree of minuteness; the nerves may be traced running into bones, but it is not known whether they terminate in the marrow, or in the compact part of the bone, if they do they are probably so loaded with earthy matter as to be insensible — It has been said, that the compact Substance, is composed of laminæ, like plates of wood laid on each other, & that to prevent these plates or fibres from becoming brittle, Nature has furnished the marrow or Oil, and transverse & Longitudinal Canals running thro' the bones to distribute it to every part; and as a proof of the existence of these medullary Canals they mention the transudation of oil thro' the bones after they have been cleaned — Monro says, that the medullary Canals are largest on the internal Surface of the bones, becoming smaller as they run into the compact Substance, & become smaller & smaller as they run inward; this fact falls to the Ground — He likewise says that the Canals for the Blood Vessells are round, & that those for the marrow are oval, or flattish; but if we break a bone thro' where an Artery sends off a branch, the hole

the hole will appear Oblong; there does not appear to be any such Medullary Canals: If we take the bone of an Animal just killed, wipe & dry it, it will become white, that is, it will have no Oil on its Surface, but let it be kept some time and the Oil will gradually transude, so that the marrow does not transude the Substance of a bone till after death, the same thing happens to the blood in the Vessells; now if the Oil was always in the compact Substance of a bone, the appearance of it would be the same in a living or a dead body, but this is by no means the case, therefore we must look upon marrow in another light than given to preserve moisture & softness in bones. The Bones appear white & Opaque in proportion as they contain less Oil. It has been an Opinion with many that the bones of People become brittle from a deficiency of this Oil or marrow, but the bones of Old People in general, contain as much marrow as when they were younger; & their brittleness proceeds from a quantity of the boney matter being carried off in old age, as we shall have Occasion to prove, farther on. A Discovery of Mr John Hunter's proves that the Use of the marrow is not to prevent the bones from becoming brittle, for he finds that some Animals have hollow bones without marrow, & that the Air of Respiration presses into them from the Lungs, particularly the Os Femoris & Humeri of some birds, yet their bones are not more brittle than those which contain marrow. There is an Error running thro' all Physiology at this time, namely that of explaining all parts of the body upon Mechanical principles, principles very different from those which exist in many parts of the Animal Machine: & therefore it has been said in explaining this matter, that a bit of hard (that is dry) wood is easily broken, but if it is soaked in Oil it is rendered tougher. We come next to consider the Cellular part of the bones; all bones have more or less of the compact Substance, & more or less of the Spongy, or Cellular, which last is always placed on the inside of a bone.

authors

The Bones

Authors have described to a great degree of minuteness the different kinds of Cells in bones, but no farther knowledge of them is necessary, than to know that they form a regular kind of Net:work; all the Cells commun:icating with each Other. It's structure is very different in different parts of the same bone. It has been a question whether in some bones there is not One large cavity without any Cancelli: generally there are some Cells but the bony Substance is the same in every part: all the Cavities are filled with Marrow. The Marrow should be considered as similar in every Respect with the Oil in the Adipose Membrane, as that is different in consistence in different Animals so is Marrow also: The Ox has a very firm Marrow when cold, the fat in the Adipose Membrane is firm also. In the Hog & Human body it is soft & greasy, their Adeps being so too. From not attending to this, Some have said that the Marr:ow in the Middle of a bone is hard, & that in the Spongy Cells at the extr:emities it is softer & more bloody, & thence called Succus Medullaris: But as far as we can judge, the Marrow is the same in all parts of the body: it's being bloody depends only on the blood contained in the very fine Vessells dispersed thro' it: when examined by the Microscope we see in it little small Masses, these are little bags full of Oil; the Marrow like the Cellular Membrane is very Vascular, fine Membranes run thro' the whole of it, & the Vessells upon these. Anatomists say there is a Membrane surr:ounding the whole Marrow, lying between it & the bone, called the Membrane of the Marrow or internal Periosteum: but this cannot be demonstrated in the Human body, because of the roughness of the inner Surface of bones; In Quadrupeds it is certainly so, & may be distinctly seen in the bone of an Ox; thousands of Vessells are to be seen in the Marrow, so that when they are injected it is uniformly red. Two Uses have been ascribed to the Marrow the first, we have already mentioned, namely, that it served to moisten the bones & prevent their breaking, and the second was, that it soaked thro' into the cavities of the Joints to lubricate them & facilitate their Motions; but it

does not

does not appear to serve any particular purpose. The Bones were supposed to be made hollow for the reception of the marrow, but the real reason of their having this form, was certainly to save the expence of bony matter, for by being made hollow, they are much stronger than if they had been solid & less in Diameter, so as to have had the same quantity of bony matter in them. The Bony Substance appears to be of such a nature as not easily to be produced in the body, for some Bones are not perfect till 20, or 25 years of Age; We see then that for these reasons there is a cavity left in a bone; now what shall this Cavity be filled up with? why, Oil is wanted in the constitution, therefore it may as well be filled up with Oil, as left empty & useless, so that the marrow is the same in all respects, as the fat in the Adipose membrane. when from any cause the Substance of the fat is wasted in the Adipose membrane, there is very little marrow in the bones & vice versâ. In an Old Dropsy, the Oil in the Adipose membrane is lost, & its place supplied with water, so also is the marrow changed, instead of it there remains in the bone a watery fluid; so that the marrow & Adeps always keep pace with each other. Thus far the Structure of Bones in general; we shall next speak of the Covering of the Bones, the Periosteum. The outer Surface of a Bone is covered always (except where it is covered with Gristle, Tendon, or Ligament, or as in the Teeth where it is exposed) with a membrane uniting firmly to it called Periosteum, and from the outer surfaces of it goes the Cellular membrane to unite to the surrounding parts. Anatomists say, that it is a double membrane made up of two Laminated Strata. The first Stratum or outer layer, they say (rightly enough) consists of Tendinous & Ligamentous fibres inserted on the bone, & therefore it is thicker in those places where there are few Tendons & Ligaments; that this is the manner in which the Periosteum is produced, is without a doubt, & that it is thicker in Some parts than in Others; The fibres of this outer Stratum are very strong, & differently disposed; besides this outer, they say there is an inner Stratum made of finer fibres running in the direction of the bone. There appears

appears not to be the least occasion for this distinction, it seems to be one sort of a Membrane only, with fibres running thro' & thro', & though it is possible to divide it into many Strata, yet it is all one & the same Membrane. The Periosteum is more Vascular than the Tendons or Ligaments, because besides those Vessells, which it has from the Tendons & Ligaments, there are others intermingled which go to & come from the bone. It has been much disputed of late, whether the Periosteum has any Nerves or not; Haller says, it is insensible; Dr Hunter says, he can trace Nerves passing thro' it, but cannot say, whether it has any spread on it's Substance or not; he thinks it insensible. Various are the Uses which have been ascribed to the Periosteum. From it's supposed exquisite sensibility some thought that it served as a Guard to the bones, to warn us of the approach of mischief. Others supposed that it served to set bounds to the growth of bones, which would otherwise increase irregularly, but bones certainly take their form from some other cause. Others supposed that it served to accelerate the blood's motion thro' the bone, for they said that the blood being thrown into an Artery, would distend that, & the Periosteum, that then the Periosteum would contract & force upon the Blood thro' the Bone, but they did not consider that as much force would be lost in distending the Membrane, as would be gained by it's reaction. Others supposed it served to unite the Epiphyses to the bones, but this appears to be an Accidental One. Du Verney thought that it served to make bone & Callus, but his Arguments are not well supported. It's Use seems to be nothing more than by embracing the Whole bones to afford a safer & faster insertion to Tendons & Ligaments and to protect the Blood Vessells from being ruptured, which enter the bones from those Muscles that are connected to them by their fleshy fibres only. We come now to consider the diseases of the bones; In the first place they may become soft & pliable in consequence of the boney matter being absorbed from them, and in some cases their texture appears to be entirely changed.

changed :- In Old Age a considerable quantity of the boney Substance is absorbed and carried away. The Marrow being a vascular part is liable to diseases, tho' it is well defended by its bony case, yet sometimes an Abscess is formed in the inside of a bone, attended with great pain & makes terrible havock before it appears outwardly. The Periosteum is now well known to be a very insensible part in its sound state, yet diseases of the Periosteum are very troublesome & tedious, by reason of its connection with the bone & when the Periosteum is much diseas'd, the bone is soon affected :- It has been long Observ'd that most poisons commonly attack the Periosteum or the bones of the extremities, the Skin, the Throat, & the bones themselves. Nodes, which were long suppos'd to be an affection of the bones are now known to be a disease of the Periosteum: the Venereal poison inflames, thickens & swells the Periosteum, and a Viscid fluid is lodged under it, which if not timely relieved will at last affect the bones themselves; but in the beginning, it is always a disease of the Periosteum only: Prudent Surgeons in such cases dont chuse to trust a Salivation alone for the cure of the Venereal disease, and leave these untouch'd, for it has happen'd that the Virus has been detained in them after a Mercurial Course has been finish'd, so that they usually open them with a Caustic first, but it is better to make a simple incision down to the bone, than expose them to Caustics. tho' they will often soften and disappear during a Mercurial Course, yet it has been found that where opening of them has been neglected, that it has been sometimes necessary to do it at last to get rid of the poison intirely. The Effect of the Venereal poison is evidently encreased by Cold. The Nodes are always found on those bones which lay near the surface of the body. They first appear on the Shins, and not till after a great length of time on the Shoulders. A Node on the Thigh bone was never heard of.

It is

The Bones

It is from the throat being so much exposed to cold, that the disease so often makes its appearance there; if then cold makes the Venereal Poison worse, we might conclude, that the disease is more inveterate in cold Climates than in Warm ones. Some say that this is actually the case, that in Portugal it is so mild, that the diseased hardly ever apply for relief, and it is also said to be very mild in the West Indies: on the Other hand Some affirm just the contrary, & say the disease is well known to be particularly Violent in the East Indies; however that be, Mercury is the Specific in that Case, and the reason why we do not get cured here so soon as in the hotter Climates is, because we cannot take such a quantity of Mercury, as is requisite, without bringing on Violent Symptoms, such as Diarrhæas, Fluxes &c from the Coldness of the Climate

Lect 13th

The General Doctrine of Bones

Lecture 13th

Writers on anatomy have described the inequalities on the external Sur:face of bones very minutely & indeed to very little purpose, thus some kind of Processes were called Capita, others Condyles &c these will be taken notice of, when we describe particular bones - The Cavities on the external surface have just as absurdly been described, Some of them are said to be cavities for Articulation, others for containing soft parts as the Sockett of the Eye, - The Colour of the Human bones being similar to that of the bones of Quadrupeds, is therefore well known - the bones of young Children are of a more purple colour than those of Adults, because their Vessells are more numerous in proportion to the bony matter - A very usefull discovery was sometime ago made by Mr Bechier namely, that animals which have fed on madder for some time have their bones colour:ed with it, & what is very remarkable the madder produces no such Effect on any other part of the body - Mr John Hunter has made a number of experiments with madder, he finds that the bones of an old Animal fed with madder will hardly be tinged with it, but that the bones of a Young Animal will be considerably tinged with it in a short time - This is an exceeding usefull Discovery, as it teaches us, in some measure how the bones grow, for from Mr John Hunter's Experiment it appears to be only that part of the bone, which is formed during the time of feeding on madder, which takes this Tinge - Some kind of Fowls are said to have black bones, but this is a mistake, their bones are of the same colour as the bones of other Fowls, but covered with a black Periosteum; here is a Proof, it may be said, that the Periosteum is not composed of Tendons, or of Ligaments, because they are not black, but we may supp:ose that there are Vessells in the Periosteum, which deposit, or secrete this black colouring, & not in the Tendons & Ligaments; but Mr Jno Hunter says -

says that the Tendons & Ligaments are coloured with it also. The Bones by a Chymical Analysis appear to differ from the other parts of the body only by having a larger quantity of Animal Earth in their Substance; it is not calcareous, but a pure Absorbent Earth, which will stand any degree of heat without Vitrifying, called therefore Refractory. This Earth constitutes so large a part of the bones as to preserve their form after all their other prin:ciples are destroyed by time. When Vaults or Leaden Coffins have been opened, in which bones have laid for ages, they have retained their form, but crumbled to Dust on the slightest touch. An Oil which is one of the prin:cipal parts of bones adheres very strongly to this Earthy Matter, and cannot be driven out without a very violent fire, it is this Oil united to the Earth, which makes what is called Ivory Black. Anatomists are unwilling to change the old terms for the Articulations of the Joints, tho' they cannot properly express their meaning by them. Galen speaking of the Articulations of the Joints, says there are two principal kinds; first those for Motion, which he calls Diarthrosis, and secondly the Articulation without Motion, or Synarthrosis, and these he subdivides into several other classes, vide Keill's Anatomy, or Monro's Osteology. This Method is a very lame one, indeed such is the Nature of the Joints, that they cannot be well divided into different classes, for the classes run so with one another that we cannot draw the line between them. In Joints there are two Advantages to be considered: One that they admit of a great deal of Motion; the other that they are strong. We can hardly have a Joint strong, & yet admit of a great deal of Motion, for the form of a Joint intended for Strength, necessarily confines Motion. The same Observation will hold good in regard to the Ligaments, the stronger & the thicker the Capsular Ligament is, the stronger the Joint will be, but then the more Motion will be restrained by it. This doctrine will be found to explain many Phænomena of the Joints.

There are

The Diseases of the Joints

There are two diseases to which the Joints are very liable: the first is Disl:ocation or Luxation, which has been divided into Luxation compleat & Subluxation; in the first instance the head of the bone is entirely rem:oved out of it's place: in the second it is only partially dislocated, or the edge of the bone rests upon the Edge of its Sockett. The Ball and Socket Joint cannot have a permanent Subluxation, as the least Motion of the Limb would determine the head to go into, or on the outside of the Socket. In the Ginglimi it may be permanent, but as a Luxation here can be made only in two directions, so a Subluxation can only be sideways; which we shall plainly see must be the case in the Joint between the Humerus & Ulna.

The Second disease to which Joints are liable, is called Anchylosis, by which is now generally understood a Stiff Joint. There are two kinds of it, one in which the Joint is quite rigid & immoveable, commonly with a firm Union between the two bones, & is always incurable; the other called incomplete is when there is not a total immobility but a little Motion remains: this when it depends upon a disease of the fleshy substance surrounding the Joint may oftentimes be cured, but when the bones are affected, it is irremediable.

The Cartilages

We shall next speak of a Substance, which has not yet been mentioned, viz. a Gristle or Cartilage, which always covers the ends of those bones, that are designed for Motion. It is a very white Elastic compact Substance, & may be known from every other part of the body by cutting it, for it never cuts as composed of threads or fibres, but like a piece of Wax or Cheese in which it differs from the Tendons & Ligaments. Authors frequently talk of a Cartilagenous Ligament & Ligamentous Cartilage, a distinction without a difference. Some Authors have defined a Gristle to be a soft bone, & say that all bones were once Gristles, but bones are of a quite different

nature

nature. The Gristles may properly be divided into three different classes, first, those which we find in Young Animals to supply the place of bone till it can be formed; Secondly those which are to remain Gristles during Life, & which are not situated in the Joints, such as those of the Ears, Aspera arteria &c. Thirdly, the Articular Gristles covering the surface of bones in the Joints. The Gristles of the first & second Class are covered with a Membrane composed of Tendinous & Ligamentous fibres, entirely similar to the Periosteum, & is called Perichondrium; it may be distinctly seen on the Thigh bone of a Child, & on the Gristles of the ribs, but there is not the least appearance of it on any of the Articular Gristles. In texture a Gristle seems to be similar to the white of an Egg fixed by boiling, & like that too it has not the least fibrous appearance, but if we saw the head of a bone half thro', and then break it, we shall see it made up of a number of fibres running perpend: :icular to the bone & to each other; there must undoubtedly be transverse fibres also to connect the others together, but they are so small as not to be discernible. The Gristle of the first Class has a few Vessels that carry red blood, but the Articular Gristles have none at all, what Vessels they have must be all of the serous kind. We can inject the Gristle of a growing bone but the red Matter will stop when it comes to Articular Gristle abruptly & form around it a Vascular border. The Gristles are supposed to be entirely destitute of nerves, & of course insensible. The Use of the Gristles is different in different parts of the body. The Use of the first Class is to supply the place of bone for some time in Young Animals, as has been already mentioned; those of the second Class are used where bone would not have been so convenient, as in the Nose Ears, & several other parts, where bones would have been often liable to be broken; the Gristles of the third Class serve to prevent friction between the ends of the bones, & from their Elastic quality, when strongly pressed on, they are in very close contact with the ends of the bones, & thus make the Joint stronger in proportion to the weight pressing upon it, & from their being Elastic they may probably prevent

Jarrings

Jarring of the Joints in violent Jumping &c by giving way, & by that means breaking the force of the blow — The Cartilages are the least liable to disease of any part of the body, & are seldom found changed in their texture; They also seem to bear pressure better than any other part, for in Aneurisms it sometimes happens, that the Ribs on their bony parts are quite destroy'd by the pressure of the Aneurism, while the Cartilages uniting them to the Sternum are sound & only bent outwards — It has been a Question, whether a Cartilage will granulate flesh or not; Dr Hunter in one Case, which he had an opportunity of examining, found that it did not, but he believes that after some time they will always unite —

The Ligaments

We are next to examine the Ligaments — A Ligament is a Substance that binds One bone to another of the Joints, it is easily distinguished from a Gristle by its inelastic quality, & fibrous texture — A Ligament is evidently the same kind of Substance as a Tendon: at the knee the Tendon may be seen detaching threads down to the Patella for its Periosteum, & passing down the fore part of the Tibia, it becomes the Ligament uniting that with the Patella, plainly therefore a continuation of the Tendon — Ligaments have been distinguished into various kinds, as the disposition of their fibres varies — Let us first consider particularly what is called a Capsular or Bursal Ligament as it relates to the Joints — A Capsular Ligament Incloses a Joint like a bag when it is entire; it may be properly considered as composed of two Laminae or Strata — The outermost runs down upon the Periosteum, & is very thick; the inner and what involves the Joint, where the cavity of the Joint ends, seems to turn & cover the Cartilage of the Articulation — In a Young Animal, we can sometimes pull off a fine Membrane from the Articular Cartilages evidently reflected from the inner Stratum of the Capsular Ligament, so that this Stratum is reflected over the Cartilages & so on to the Ligament again without end, making a compleat bag for containing Synovia — The Laxity, or Length of the Capsular Ligament is in proportion to the

largeness

largeness of Motion in a Joint, so as just to allow of necessary Motion — Dr Hunter says, he has been often puzzled to account for the crackling of the fingers, when they are pulled & he thinks it may be by the two Surfa: :ces having first made a Vacuum by their Attraction, & then, when the Vacuum is taken away by seperating the bones, the crackling is produced; for after they have once cracked, if tried they dont crack again unless the bones be moved one against the other for some little time first — In some Joints the Capsular Ligament is not inserted far from the Surface of the Articulation, but in those which admit of a great variety of Motion, it is inserted far on the bones — It is observable in the cutting off a Joint that we do it more easily if the bone be thrust as far on one side as possible, for by this means there is a greater part of the Ligament actua: :lly forming the Joint put on the Stretch, & therefore we can cut the Joint with more certainty — Besides the Capsular Ligament there is an other within the Joint to connect the bones together, and it restrains Mo: :tion, & prevents Luxation, but of this more by & by — The Capsular Ligament confines the Synovia in the Joint; this is principally the use of the inner Stratum of fibres which involve the Joint all round; it also serves to prevent the fleshy parts from being pressed between the ends of the bones and pinched — But then what prevents itself from being pressed into the Joint on the lower side? It is prevented by the Tendon of the Muscles in Action, which being fixed to the Ligament draws it out of the Way at the time the Joint moves, but it is some: :times forced between the bones by external Violence ———

Lect. 14th

The Ligaments

Lecture. 14th

Besides the Capsular Ligament before examined, a Joint has corrobo:
:rating or lateral Ligaments. The Capsular Ligament is of the same
strength & thickness all round. In the Ginglymi Joints to bind the
bones together more firmly there is a Ligament placed on the sides, where
the ends of the bones do not recede much from each Other, in Flexion and
Extension as on the sides of the Elbow Joint. In the Knee Joints there
are Ligaments arising from the Middle of the bones, where there is a
deep Notch in their hinder part, which being on the stretch in Extension
set bounds to the Motion, & prevent the Legs from going farther than
to form a straight line with the Thigh for there is nothing in the
form of the Os Femoris, Tibia, Fibula, or Patella to stop Extension.
Ligaments & Tendons have no Elastic property, for if they had they
would recede from each other, and as Tendons being inelastic Substances
are often ruptured, so are the Ligaments from violent exertion, as Leap:
:ing, Dancing &c. Indeed there is one which has the property of being
Elastic, the Ligamentous Substance between all the Vertebræ, which we
shall take particular notice of hereafter. Till within these few Years
Tendons & Ligaments were supposed to be exquisitely sensible. Dr Hunter
says, that from Observing that the Ligaments, Tendons, Dura mater, & Peri:
:osteum appeared to be entirely similar in Texture, he was induced to believe
that they were all equally sensible, or insensible, that from Observing an
incision of the Dura Mater gave no pain, that the Periosteum when scraped
in Amputation gave no pain, that the Tendons of a Man's hand which were
laid bare by an Hanger gave no pain when pressed on, & from several other
Observations of the same kind, he first began to doubt of their Sensibility.
A Gentleman whose Tendo Achillis was almost ruptured through by
different parcels of its fibres giving way at different times, informed him
that at the time he felt no pain, only a Sensation as if something had given
way in his Heel. From many Observations which he has since made, he is
thoroughly

thoroughly convinced of their insensibility, or at most that they enjoy Sensibility in a very low degree — Bleeding in the Arm is sometimes attended with great pain and very alarming Symptoms; this was accounted for by saying that the Tendon was wounded in the Operation, that the great pain caused by a partial division of the Tendon arose from the remaining fibres that were entire having their extreme sensibility encreased by being put on the stretch, and therefore they advised dividing the Tendon entirely to take off their distention — But Dr. Hunter says all those alarming Symptoms are generally the consequence of the Nerve being punctured and not the Tendon — Haller by many exp:eriments has proved the insensibility of those parts, but he attributed too much to insensibility, thinking that wounds of these parts would heal as soon & as kindly as others — But this is contradicted by daily experience, for most terrible consequences often ensue from wounding them, and sometimes Death — A number of parts about a Joint appear to be exceedingly sensible, at least we imagine so from the great pain in Gout & Rheumatism — It seems probable therefore, that they have a very small degree of Sensibility, which is exceedingly increased by inflammation, or otherwise; that parts may have an increased sensi:bility, when naturally they have but little, is evident, for when the hand is warm, if we rap our knuckles against any thing gently it will pro:duce no Uneasiness; but when the hand is very cold, if we then rap them with the same force, it will be very painfull — The Reason, why infla:mmation of the Joint is so very painfull, is probably owing to the Parts about a Joint being so much confined by their structure & situation that they can distend or swell themselves but very little — This is also the reason why a Whitlow of the finger is more troublesome to a Patient, than an inflammation on the Arm, the Skin in the latter allowing more room for Distension than the former —

Luxations

We come

Luxations

We come next to speak of Luxations — It was the general doctrine that when a bone was luxated, that the Capsular Ligament stretched & dilated before the head of the bone, but upon examining the Capsular Ligament in a dead subject, One would conclude a priori, that it is too strong & tight to admit of a Luxation from external force without being ruptured — Dr Hunter says he believes that the Capsular Ligament is always torn, for he has several times attempted to luxate the Humerus & Femur in a dead Subject, but never could effect it without tearing thro' the Capsu:lar Ligament &c. These Trials he thinks are conclusive, because Mechan:ical force acts exactly the same, on the Dead as on the living Subject. He says the Phenomena of Luxations prove this Theory; sometimes a Dis:located bone is reduced with great ease, at other times not without great difficulty — This difference was accounted for by supposing that in the first case, the Muscles made little or no Resistance to the Reduction; but that in the second, they contracted strongly, so as to require great force to overcome their action: It is clear however, that the Muscles do not contract so much as to counteract us in making Extension; when the Patient gives himself up entirely to our Direction — The difficulty then consists of reducing a Luxated Bone in the smallness of the Rupt:ure of the Capsular Ligament & the direction in which it is ruptured so that sometimes by making a strong Extension we shall be so far from reducing the Luxation, as even to render it impossible to be perform'd in that manner — After having used all manner of Extension and means of Reduction to no purpose, it sometimes happens that the bone goes into its place voluntarily as it were — Dr Hunter says, that the torn Ligament embraces the head of the bone as a Buttonhole does a Button, and prevents its return into the Joint, and that by turning the Limb to and fro; there is a much better chance of reducing the

Luxation

Luxation by wriggling the bone through again, than by making strong Extension, which often tightens the stricture, and increases the difficulty. It may sometimes happen that a disease of the Joint may so relax the Capsular Ligament as to allow of Luxation without being torn, but when the Luxation happens from external force, Dr Hunter believes that the Ligament is always torn. The reason why Laceration of the Capsular Ligament does not occasion great Mischief as a Wound penetrating the Joint does, is because no air is admitted to it. There is found in the Cavity of all Joints that have motion, a ropy fluid, by far the most lubricating of any known called Synovia, supposed to be Sepper:ated by Glands called Havers Glands situated in the Joints. It was farther said, that the number & Size of these Glands were adapted to the different motions of the Joints & that their Secretion was promoted by pressure; The Bulk of these Substances are not Glands but Fat, we know this Fat by the taste of it in boiled meat, which is very different from that of a Gland, & in a Dropsical Subject these Substances are found to be only Cellular membrane, filled with Water. It appears then that the Interstices of the Joints are filled with Fat, by the same laws of the Animal Œconomy as the Cellular membrane & Bones are; besides in the Cavity of the Shoulder Joint which admits of large motion & of course requires (and has) a great quantity of Synovia; we do not find the least appearance of this substance, because the Joint is every where regular & without any Cavity to contain it, which plainly proves that this supposed Glandular body does not furnish the Synovia. From the inner surface of the Capsular Ligament being extremely Vascular, it is reasonable to suppose that this membrane is the Secretory Organ. It has been said, that the Synovia was a Compound of water & oil transuded from the bone thro' the Cartilage, but as it is evident, there is no Transudation in the living body, this cannot be the

way in

way in which the Synovia is made; it is most probably secreted by the Bursal Ligament, however that be, it is exceeding well adapted to the purp:
:ose, & in many cases it would be much better to dip the finger, or a Wax:
:Candle in Synovia rather than in Oil, when they are to be introduced into parts that are very irritable; — Persons of Scrophulous habits are most subject to diseases of the Joints — In that disease of a Joint called a White:
:Swelling, there is always a redundancy of Synovia, which when let out appears to be mixed with matter — Authors say, there is sometimes a defic:
:iency of Synovia as when a Joint crackles, also it may be too thin, or too thick; these opinions appear reasonable, but we must remember it is only Theory; — Some have accounted for a Limb's becoming stiff, or it's remaining motionless for some time, as in a Fracture, by supposing that the Synovia has a Tendency to concrete on Stagnation, & that it was kept in a fluid state by the frequent motion of the Joints. It has also been said, that when a Bone has been Luxated for some time, the Cavity of the Joint is filled up with concreted Synovia, which makes the reduction impra:
:cticable. Dr Hunter says, he is very clear that Concretions of the Synovia never happen, & that the reason why a bone, which has been long luxated cannot be reduced, is, because the surrounding flesh has been united with the head of the bone — Chalky Concretions are very troublesome in the Joints of old People — In one Case Dr Hunter found the Synovia white like Cream occasioned by a Chalk Stone having been rubbed down by the motion of the Joint into a Powder, some of which being too gross to remain suspended in the Synovia had fallen down to the most depending part of the Joint, & in this case the Cartilages are eroded.

Let us next consider the Bones as to their Number & Classes — The number of the Bones differ in different People & in different Ages: In a Young Animal there are more than in an old One, for instance, the Femur, which in the Adult is but one Bone, is made of four in a

Child

The Number & Classes of Bones

Child. — The bones like the Joints cannot well be divided into distinct Classes, because in fact they all differ One from Another, & Classifi:cation is at best, but an idle thing. — If we do class them, we shall, for the sake of referring to a Set of Bones divide them into four kinds with regard to Structure: First, the Cylindrical, or those which are nearly so, with their Apophyses, & Epiphyses made large at the ends to allow a greater Surface for articulation & the Insertion of Muscles; the Middle of these bones are the smallest part of them, but they contain a much greater quantity of bony Matter, which adds considerably to their strength in that part. — The Second, the Spherical such as the Patella, Bones of the Carpus & Tarsus on the outside hard like a Shell, and spongy within. — The third, flat as the Ilium & Bones of the Skull with hard compact Plates on each side, & a spongy texture between them called Diploe & Meditullium. — The fourth, the irregular bones, those which partake the properties of the other three, such as the Vertebra, the Bones of the Face & others; — In the Foetus we find that the Muscles, Tendons, & all the fleshy parts appear distinct, tho' exceeding small, & of very tender texture, therefore we shall not enquire how they are formed, but with the bones it is very different & therefore it shall be the Subject of our subsequent Lecture to treat of them —

The Formation of Bones

Lecture 15th

We are now come to the last part of the general Lectures, that is, Osteolo:gy or the Formation of Bones – we shall begin with the Class of Flat bones, & particularly the bones of the Skull, not however those that form the Basis of the Skull, the first appearance of Ossification in these Bones is in the Center, a Net work of fine bony threads is formed, the strongest of which are disposed in a Radiated Manner from Center to Circumference, and bound together by transverse fibres of bones, these encrease daily while Ossification is going on, the part is exceeding Vascular the Vessells fill:ing up the Interstices of the fibres & of course following their direction.

On these it is plain, Bones are originally made up of Fibres, the Fibres compose Plates, and the Plates added to one another form the strength & Thickness of the bone, the plates lying over one another like the Slates of an House, the lower One projecting beyond that which is above it – There is a question with regard to the Theory of Ossification, it is this, whether or not there is a Cartilage all round the little bony fibres while they are growing? that is, whether the bones are previously in a Cartilaginous State? Albinus thinks there is, tho' so very thin as to be overlooked – there seems however to be nothing like a Cartilage, for the bones of the Skull appear too short. On a Membrane as Dr Nesbitt thinks, with regard to the Periosteum of the Bones of the Skull, they seem to have it independant of Tendon or Ligament, it is laid in layers like a gradual compress and seems to be formed from the bone itself, for by examining it we find, as the plates of Bones are formed, they destroy the inner Lamina of the Perios:teum, and the Lamina are soon continued at the edge of the growing Plates – When these bones are first formed and thin, there is no

Meditullium

meditullium, but as they increase & grow thicker the meditullium appears, the process by which this is brought about we are not acquainted with — The next to be considered are the Cylindrical Bones — These Bones appear to be previously Gristle covered with a Periosteum very loosely connected with it; this can only be seen in the incubated Egg, which was very particularly examined by Haller in all its states — He says, the Gristle is covered by a Periosteum, (call'd in this part Perichondrium, and that it is not attached to the Gristle; in this he appears to be mistaken, for the Periosteum is adherent to the Gristle: this we are convinced of by being able to trace the Vessels passing from one to the other — The first appearance of Bone is in the middle, first, a cloud appears in the Substance of the Gristle, which increases, and hardens daily into bone — At this cloud the bony particles may be felt with the point of a fine needle: this Ossification shoots farther & farther from the middle, till both ends are formed — this first appearance of Ossification is only to be seen early in the Fœtus, in the Thigh bone & Tibia, all the cylindrical bones appear to be formed in this manner — The Periosteum of these Bones may be divided into Lamina, & appears to be entirely similar to that in the Flat Bones — It has been the common opinion, that Ossification in these Bones is first formed of fibres & plates, in the bones of the Skull, but we can never see any appearance of fibres, the bony particles shooting into a very irregular spongy body, not detached but close — As the Bone shoots from the middle towards the Extremities, the Cartilage becomes shorter & shorter — and while this is going on a new Ossification begins at the very Center of the Gristle at the Ends, & makes the Epiphyses: the Ossification is perfected in the very Center of the Gristle first, & becomes larger & larger shooting quaquaversum: the body of the Bone & Epiphysis have but a thin Gristle between them, so that in boiling they seperate, but as the Bones

grow in

grow in the Adult this Gristle is obliterated, & the two Ossifications remain united very firmly; One would think from it's hardness that a Bone would not alter it's figure, but it does both in length & thickness. now the Question is, as the body increases in bulk, are the fibres of a bone lengthned out, or is there is a new addition or continuation of bony matter joined to them? It seems to be by an addition to the end of each fibre, & by it's stretching too, like the shoot of a Tree. Du Hamel, says that like the Shoot of a Tree they grow least in the middle & most at the ends, but Mr John Hunter says, they lengthen as much in the middle as at the ends. Then it may be asked, how do the bones increase in thickness? This appears to be produced by the fibres having some ductility & stretching. The reason of Epiphysis being form'd distinct from the body of the Bone has not yet been explained. Various are the Uses they have been suppos'd to serve; Some have thought that their Use was to confine the growth of the bones within proper bounds; but we may then ask, what sets bounds to their growth besides, for it is only some bones which have them: another Opinion, (foolish enough) was the Capsular Ligament by running between the body of the Bone & Epiphysis might be more firmly united; It is sufficient to say that it does not go in between them, but runs on the surface down the bone. Another supposed Use was that they made a kind of Joint to facilitate the birth of the Child, & prevent the bones from being fractured; but the ends of the bones at Birth are Gristly, & capable of being bent conside:rably. Albinus's Doctrine appears most plausible, he says that in the long projected Cylindrical bones, Nature sets up two Ossifications to perfect the bone sooner, & because the Ends are to be larger & projecting that the new Ossification will form them so much better than the first: but for ought we know to the contrary, the first Ossification would have done just

done just as well, their use has never yet been clearly made out; Birds have no Epiphyses, the bones of their Wings are hollow, but contain no marrow and Mr John Hunter has discovered that they have a Communication with the Lungs in Respiration, for air blown into them will inflate the Lungs — Ossification begins in the Center of the Spheroidal Bones, they are at first, nothing but Cartilage, & as the Ossification advances, they appear to be exceeding Vascu: lar; It is very Observable that in those bones a branching Artery first begins to ossify in the middle of the Gristly Substance, putting on the appearance of a branch of a Coral — the Ossification of the Irregular bones puts on differ: ent appearances in several parts of the same bone; the Whole is at first Cartilage having Ossification beginning in several parts, as in the Os Innom: inatum there are distinct Ossifications forming the Ilium Ischium & Pubis, and in the Vertebra there are four points of Ossification surrounding the Canal for the Spinal marrow, one on the fore part, one on the back part on the Spinal Process, & one on each transverse Process — In bones of considerable extent having several points of Ossification we see great Variety in their number, as the Breastbone for instance is sometimes composed of four, sometimes of five, & sometimes of six distinct bones; Ossification proceed differently in different Constitutions & in different bones; Some bones are always compleatly ossified at birth, for instance the ribs and little bones of the Ears; others remain unossified for years; The Patella seems to be the last in which Ossification begins — In the next place we are to consider the Theory of Ossification — This was accounted for by saying, that every part of our body has a Tendency to grow harder, that a bone is at first a fluid, next a Jelly, next a Gristle, & next becomes bone; Ruysch made a great noise about this at one time; It was then said that the Action of the muscles and of the Vis Vitæ in general condensed the soft substance into bone, and that the Action of the Arteries assisted in condensing them, but numberless Observations teach us that it is not

prepare

pressure, which converts the Cartilages into Bone, something more is required towards Ossification - Others have said that Gristle was conv: :rted into bone by a Deposition of earthy Particles into its pores, and becomes stoney, and as a proof of this they say, if a Bone is steeped in an Acid, it becomes soft from the Acids dissolving all the Earthy matter & leaving the Bone in its Cartilaginous state; that the Earthy Matter is dissolved by the Acid is plain, for if an Alkali be added to the Solution the Earth will be precipitated in a fine powder; This is one of the most general Opinions among the Moderns, - Another Opinion is that of Du: Hamels, or rather taken from Dr Grew, who in his Anatomy of Plants says, that a layer of wood is produced from the Bark of a Tree yearly, so that when the Trunk is cut transversely, it makes a concentrated Surface, that the Bark was converted into Wood, & that by the number of these layers the Age of a Tree might be known - Du Hamel made a number of Experiments to prove that bone is formed by the Addition of hardned Lamina of Periosteum run into Ossification, as the Wood is for: :med of Bark, & said that the Callus was formed in the same manner This Theory tho' ingenious, cannot possibly be true, because we Observe that Ossification begins in the middle & internal parts of the Spheroidal Bones - Dr Nesbitts Theory seems to be most plausible, and best founded; it was first published about 40 years ago; Haller hardly mentions it, & Albinus not at all, because Dr Nesbitt took his Opinion from Albinus, and published it as his own; He says that Bone is a new Substance, and not a Gristle changed into bone, & that the manner of its production is two fold; in some parts that the Bones sprout & grow in Membranous beds, as the bones of the Skull and the Teeth; in others the bone is formed as in a bed of Gristle - An Argument for the bone being a new Substance is, that where the bone is found in Gristle, they are manifestly two different substances, and may be seperated at the Epiphyses - It might be said that the fibres of the

Cartilage

The Formation of Bones

Cartilage are continued from one end of a bone to the other, & that the bony matter is deposited round them; but the Epiphysis is easily sepe:rated from a bone, without the least appearance of a Gristle breaking, and by long steeping that part of the bone which is Ossified, it may be taken out of the middle of the Gristle, like a kernel from it's shell, and after steeping a bone & pulling off it's Periosteum to clean it, the Gristle seperates with the least possible force, the bony part too is extremely Vascular but the Vessells terminate Abruptly when the Gristle begins this seems to be the best Theory, that Bone is a new formed Substance, there is one thing which may seem to be an Objection to it, We may ask, if Bone is a new formed Substance, what is that which Remains behind the steeping of a bone in an Acid so as to dissolve all it's Earthy Particles? It is not Gristle, but it may be said to be the Skeleton of a Bone, composed of Vessells & Gluten cementing the particles together — We have now done with the general Lectures on the Constituent parts of the body, and shall next proceed to the particular Anatomy of the parts beginning with the bones —

According to Dr Nesbitt, Bones may be said to have their Seeds, that the Seeds of the Bones which form the Arch of the Skull are deposited in a Membraneous bed composed on the inside of the Dura Mater, and the outside of the Pericranium, and that in all other parts of the body the Seeds of the bones are deposited in beds of Gristle, and that no Bones appear to shoot in a fibrous manner, but those that form the Arch of the Skull —

The Bones of the Trunk

Lecture. 16th

In describing particular bones we make use of the Skeleton, which is of two kinds Natural and Artificial: when a Skeleton is prepared with the Ligaments & Cartilages remaining, and connecting the bones together, it is called a Natural One: if in the preparation the bones are connected together by Art, as by Wire &c it is then called an Artificial Skeleton — The most common Order of demonstrating the bones is to begin with the Head, and so proceed downwards to the Feet, but this is a bad Method, because the bones of the Head are the hardest to be understood, besides we consider the Head as an extreme part of the body; it is better therefore to begin with the Basis of the Whole, and as the most natural state of the body seems to be sitting or lying, the Trunk at first view will appear to be the Basis; we will therefore begin with the Trunk: — The Trunk naturally divides itself into an upper, and a lower part, the Chest & the Pelvis connected together by a Bone Chain called the Spine — As the Spine forms the principal part we shall describe that first — The Spine runs the whole length of the Trunk, from the head to a little below the Anus, it is composed of the Os Sacrum, the Os Coccygis, & twenty four Vertebræ — The Spine in a well formed body appears to grow up perfectly straight, if examined in a fore, or back View it makes several curvatures: the reason why the head app:ears to be turned downwards, is, because we are commonly employed in looking at something below the Level of the Eyes — The Spine may be said to resemble two unequal Pyramids joined at their Bases, the Vertebræ forming One, and the Os Sacrum & Os Coccygis the Other, — It is given us with three intentions; first, to be a chain of bones connecting all the parts of the body together, & when in an Erect posture the whole as a perpendicular Pillar, its principal strength being in the fore part: —

Secondly

The Bones of the Trunk

Secondly, by being formed in different pieces it allows the body while the processes of the different Vertebræ serve for convenient Attachment to many muscles; thirdly, it serves to protect the Spinal marrow, the least Crush of which in the neck causes immediate Death — It will not be necessary to describe every constituent bone, for by giving a general description of one, we shall in a great measure comprehend the Whole — In each Vertebra we may remark first, that the body of it makes the Pillar for support, next that it has one Spinal, two transverse, and four Oblique or Articular Processes with a hole between the body & the Spinal Process for the passage of the Spinal marrow — In the sides of the body of each Verte:
:bra at the root of each transverse Process there is a notch which forms with the Process of the Vertebra above it, a hole, that communicates with the great medullary Canal thro' which passes a pair of nerves — These holes in the Spine are called the Lateral holes — The bodies of the Vertebræ have a Ligamentous Substance on their upper & under Surface to unite them to One Another, this is composed of concentric fibres hard on the outside, & almost Gelatinous within — The Articular Processes make a moveable Joint, and are therefore tipped with a small Cartilage where they touch — The Roots of the Spinal Processes are connected together by an Elastic Ligament similar to white leather — These in general have but little motion: the twisting motion of the Spine is greatest where the Vertebræ are largest; the seeming great twisting of the neck is only that of the Head — We shall here make a few Reflect:
:ions on Ligaments — That Ligament between the Bodies of the Vertebræ, not Elastic — But behind there are Elastic Ligaments between the Spi:
:nal Processes — These Elastic Ligaments in some measure serve the purpose of keeping the body upright, for without muscular Action the body bends forwards by its own Gravity, so that these Ligaments

serve to

serve to assist the muscles, because all the Voluntary muscles soon tire when in Action, and when fatigued & relaxed, the body would fall forwards, but those Elastic Ligaments prevent it, till the muscles acquire power, and by being Elastic they do not hinder the bending of the body by the Flexors. Nature has provided Elastic Ligaments to keep up the Talons of a Lion, Tyger, Cat, & other Quadrupeds of this kind to keep their points from being worn away. These Liga-ments are stretched along the upper part of the Bones of the Toes & keep the Talons drawn up in the Sheaths, when the Creature does not mean to use them, they save a great deal of muscular Action. We have considered the Vertebræ in general, & now we will consider the peculiarities. The Vertebræ are twenty four in number, we divide them into three Classes, seven Cervical, twelve Dorsal, & five Lumbar. We may observe of the Lumbar Vertebræ, that the greatest breadth of their bodies is from side to side, their Spinal Processes run almost Horizontally, the upper edge being thinner than the under, their transverse processes are long & slender, the middle Vertebra has the longest of all, all the lower Oblique Processes articulate with the upper. The hole for the Medulla Spinalis in these Vertebræ is Triangular. The bodies of the Vertebræ of the Back project forward, therefore they are broadest from the fore to the back part, & there is a Notch on each side where the Ribs are articulated, which distinguishes them from the Lumbar & Cervical, their Spinal Processes are long & pointed downwards, the transverse are the strongest of all in the Spine, & have a Cartilage on their end where the Ribs are articulated, (except the two lower Ones, which have hardly any transverse processes) the Articular or Oblique Processes have nothing particular in them, the Canal for the Spinal marrow is small & round. The Vertebræ of the Neck are the smallest, their bodies project very little forwards, hardly beyond the transverse processes, and are

flattened

flattened on the fore part, the principal length then is from side to side, the surface of each Vertebra is rounded at the bottom, & hollow at the top, their Spin:al Processes are short and end in two points; each of the transverse Processes ~~are~~ except perhaps of the lower Vertebra, has a hole for the Vertebral or Cervical Art:ery (principally) to go up to the Skull, the Medullary Canal is triangular as in the Lumbar. The two last or upper Vertebra of the Neck are different from the Others, & deserve particular Attention. The lower of the two called Vertebra Dentata from a Tooth like Process in its upper & fore part, round which the Head moves by means of the Atlas in the Rotatory Motion, that part of the Process which rubs upon the Atlas, is covered with a smooth Cartilage, the Spinal Process is remarkably long, & stronger than in the other Cervical, for the convenient Attachment of Muscles that turn the head from one side to an other, the oblique or Articular Processes are two round Convex Surfaces, which allow the Atlas to move round on them. The last or upper Vertebra of the Neck is very little more than a Bony ring, having as it were a double Canal, the interior part of the Canal receives the Tooth: like Process; the Spinal Marrow passes down the posterior, a very strong Ligament divides the two to prevent the tooth like Process from pressing on the Spinal Marrow, for should the Process be dislocated & press upon the Spinal Marrow, it causes immediate Death; (If an awl be run into the Spinal Marrow at this part it kills without a Convul:sion.) that part of the Atlas which plays upon the Processus Dentatus has a Cartilaginous Surface, it's Spinal Process is very small, & cannot be felt in the living Subject, the transverse processes are larger than in the other Cervical Vertebra to allow convenient Attachment to several Muscles. Anatomists observe that the Spine is exceedingly well adapted as a Pillar of Support to the body, it is a fine Composition of Strength & Flexibility made up of a number of Joints; many have supposed that there are so many Vertebra that the Spinal Marrow might not be bent too much in the several Motions of the body, which must have been the

Case, had

Case, had there been only two or three, but we may Observe that where the Spinal marrow is most important, as in the Neck, it is most bent, & least bent where it is least important as in the Loins; the true reason appears to be to make the Back the stronger, for joints are always weak in proportion to the largeness of their motion — The Spine is often found awry or crooked, & this has been accounted for very differently by different Authors — Havers, Du Hamel, & Glisson say, that from some unknown cause the Bones grow thicker on one side than on the Other, which must of course throw the body awry, — Mayreau, who was of opinion that the Muscles of the body were always in Action to keep up an Equilibrium, says, that from a weakness of the Muss:cles on one side, the Trunk is drawn to the Other by the prevailing Ones, & thus the Muscles were the cause of a distorted Spine — Ossification, we have shewn, evidently depends on Earthy or bony matter being produced in the Habit, but in some Constitutions the bones are too (soft,) as in the Rickets.) from a deficiency of the Ossific matter — now when bones are too soft to support the weight of the Spine, what must be the conseque:ence? If the Spine was to be kept always in an Erect & Perpendicular posture, the consequence would be, the body would not grow to it's proper height, because the Vertebra would be flattened, but in general the weight of the body presses more on one side than the Other; and the bones being easily bent when soft, take a Curve not from the Ossification being irregular on one side, but by the pressure on the Spine from Above, for where the pressure is the greatest the Vertebra will give way most, & if we exam:ine Crooked Spines, we shall find, that on the concave side, part of the bony matter has been actually pressed out forming several little bony knobs —

The Bones of the Trunk

Lecture: 17th

When once a Curve is formed in this soft state of the Bones, it increases commonly very fast; if the Spine is curved in any considerable degree, it becomes curved in another place also, one hip being higher than the other; the reason of this is because when we move the body, we are always obliged to bring the Pelvis to the Center of Gravity, so that when a Spine is much distorted, we always find two Curvatures at least: It may be asked at what time of Life does this Curvature begin in the Spine? In general not very early in Life; in Ricketty Subjects it frequently does not begin to bend till after they are Ten years old, & sometimes not before their Eighteenth year; tho' perhaps their Legs are growing crooked all that time: Dr Hunter says, the reason why the Curvature of the Spine does not begin sooner is, because the Vertebræ do not ossify till late in Life, & the Cartilages cannot be bent to that form, so that the most crooked Persons are always born straight Children are often born with a kind of fullness or small jutting out of the Ribs on one side more than the other, but this is a thing of no consequence, we may be pretty certain it will not increase. The first Symptom of Ricketts is an enlargement of the lower end of the Ulna & Radius, particularly of the latter; they become soft & spongy next the Anterior bony Ends where they join the Cartilages, swell & form Knobs: the Tibia is commonly the first bone that bends; every Appearance in these Cases is easily accounted for, the softness of the bones, & the pressure made on them — the best Method to prevent Crooked Spines is to strengthen the Constitution, to Effect this no Remedy is equal to Cold bathing, especially if the water is very cold — Children of Ricketty Habits may be used to it very soon, they should continue in the Water but a very little time, only an entire dip and out again, afterwards they should be well dried & rubbed Such Children have often slight Cutaneous Eruptions, but this does not

forbid

The Bones of the Trunk

forbid the use of the Cold Bath — When the Spine is much bent, Art can be of little Service; but by bracing the habit we may perhaps prevent the disease from growing worse. Lying in an Horizontal posture should be used as much as conveniently can, & when up the Patient should sit in a Chair, which has a branch & Collar fixed to it to suspend the head, & keep off pressure as much as possible. Another kind of Incurvation is when from a softness of the bones, the Spine bends in a Serpentine form, such persons are commonly very weak in their Limbs, tho' seldom Paralytic but when the Curvature shoots in an Angle as is sometimes the Case, (& is supposed to be owing to the Spine's being broken or injured, tho' it commonly attacks young Persons from a Scrophulous Cause,) the Palsy of the lower extrem:ities is the consequence beginning gradually with a numbness & weight of the Legs, and this generally before any Bunch is observed on the Back; it is sometimes caused by a blow on the Spine, & sometimes from an Abscess destroying part of the body of one or more of the Vertebra — If we are consulted upon a Case where there is a Numbness or Weakness in both Legs, we may certainly conclude that the Injury is not in the Legs, but in the Spine, and we should carefully examine the Patient to see whether a Vertebra has started, which is a Case that happens more frequently than is generally imagined; indeed when known we can do but very little; it will however be proper to make the Patient lie as much as conveniently can be done to take off the pressure. Commonly we have 24 Vertebra, sometimes tho' very rarely there is a Supernumerary One. It was some Years ago observed, that a Man is not so tall at Night as in a Morning, and this was accounted for by saying the Cartilages between the Vertebræ were pressed closer together in the daytime by the weight of the body, which being removed its effects were taken off by

lying in

lying in an Horizontal position, they expand towards the Morning & render the body taller, but several little circumstances will also contribute to produce this Effect; the Cartilages of the Joints of the lower Extremities, by being continually pressed during the day, may have some of their Elast:icity destroyed, & their fibres made to lie closer, which pressure being removed by lying in Bed during the Night, the Cartilages may resume their Elasticity & former thickness – Another circumstance too is this; the fleshy part of the Top of the Head & Sole of the Feet are thickned during sleeping horizontally, by the bloods flowing to them in a greater quant:ity at that time: all these Circumstances concur to to make us a little taller in the Morning than in the Evening – We now come to consider the lower part of the Spine, the Pelvis – this is a strong irregular Circular bone making the lower part of the Trunk, hollow on the inside; the great use of this part of the body is to make a fixed point for the Attachment of very many Muscles, and to support the body in sitting and standing, therefore the bones go all round – These Bones go downwards in three parts making three Notches; thro' them the great Sciatic Nerves pass down to the Thigh; in the Anterior Notch the Parts of Generation lie; the two Side Notches are called the great Sciatic Notches – We call that the cavity of the Pelvis which reaches downwards from the Os Pubis before, and upper part of the Os Sacrum behind, all above it belongs to the general cavity of the Abdomen, therefore the Bowels form an Angle in passing from one to the other or The Pelvis is made of three pieces, easily seperated from One Another: behind is the Os Sacrum and Os Coccygis which together form one Triangular bone, and on each side of this are the Ossa Innominata meeting before and firmly adhering. Thirdly the Sacrum is something

like the

The Bones of the Trunk

like the Vertebræ, it has holes for nerves, Spinal, Transverse, & Oblique Processes, and Bodies evidently distinguished by ridges on its inside, it has commonly four pair of Foramina, sometimes five; thro' the Anterior Foramina the nerves pass that make the great Sciatic; but the use of those behind is not so clear, as there is no principal nerve passes from them: The Connection between the last Vertebra of the Loins, and Os Sacrum is the same as that of the other Vertebræ with one another. The Os Coccygis is of a very Spongy nature, so that it is frequently destroyed by boiling the bones; it may be said to be composed of four bones which have some motion in young Subjects: we may observe great Varieties in different bodies; most Ossa Sacra are generally composed of five bones; sometimes they have Six, and the Os Coccygis has but three. Dr Sail in the Introductory Preface to his translation of the Coran, says that Mahomet taught that all the body of a man was reduced to Dust except the Os Coccygis, which is preserved as a Leaven to make a new body, so that it never dies; in Quadrupeds it is continued to form the Tail. Carpus, or Berengarius Carpensis, as he is called, in the year 1520 wrote a Comment upon the Book of Mundinus, which was held in the greatest Veneration by himself and others as mentioned in the Introduction; he says that in far distant Western Islands (he lived in Italy) there is a People called Hiberni, with long Tails, two of whom he had seen, but as he had not handled them he could not tell whether the Substance of the Tail was Cartilaginous, Fleshy, or otherwise, and Linnæus at at this present time thinks that Some of the Human Race have Tails, for instance, the Ouran Outang. At the time of Harvey a story of this kind

kind was believed by him; he tells us that a Surgeon returned from the East Indies, a man of Veracity informed him, that he saw a Young Femal taken from the Woods in the Island Borneo, who had a long Tail, but it is very certain among the Human Species there is nothing of this kind — Diodorus Siculus tells us of a voyage undertaken in consequence of a Dream to find out very rich things; the Voyagers after the third day's Sail came to an Island where the People were different from themselves, (Ægyptians) they had Ears reaching so long down on each side, and so broad, that they served as a Bed and Covering, when they reclined on either side, and they were Cloven or Double tongued, so that they could hold conversation with two Persons at the same time — However the Relators of these Stories are respected, they are nothing more than flagrant Impositions upon the Credulity of Mankind. — By Commerce we not only acquire a great stock of useful Learning, but get rid of many Prejudices which we imbibed when young — It had been said that the Procidentia Ani was owing to a Relaxed State of the Os Coccygis, but it is not, it is an Inversion of the Rectum — The Os Innominatum is originally made up of three pieces, called the Os Ischium, Ilium, and Pubis, — the Ilium makes part of the Acetabulum, and below it constitutes a part of the Wall of the Pelvis, the forepart of the Spine of the Ilium terminates in a Point called the Anterior Superior Spinal Process, and a little below this is another called the Anterior Inferior Spinal Process; on the hinder end of the Spine there are said to be two Posterior Processes, but it is only a small Notch in the Bone; the Ischium forms a part of the Acetabulum, and every where is a part of the Pelvis, behind it has a small

small Process directed towards the Sacrum, below this is the Tuber: :osity of the Ischium upon part of which we rest when sitting — Ligaments go from the Os Sacrum to the small Process and Tuberosity of the Ischium so as to inclose the Sciatic Notch; between these Liga: :ments the Internal Obturator Muscle passes and plays round the bone as on a Pulley. — The Os Pubis joins it's fellow on the fore part, which Junction is called the Symphysis — It forms a part of the Acetabulum and of the great Foramen, and composes part of the Walls of the Pelvis, where it forms the upper Arch of the great Foramen it has a Notch for the Artery, Vein, and Nerve called the Obturators, on it's upper Surf: :ace there is an hollowness over which Pouparts Ligament is stretched and forms a passage for the Crural Vessels, which run down between the Pectineus, and united Tendons of the Psoas and Iliacus Internus —

The Bones of the Trunk,

Lecture. 18th

The Foramen Magnum is Oval, just over and before the Tuberosity of the Ischium, it gives Insertion to the Obturatores Interni and Externi, and the Obturator Artery, Vein, and Nerve make a Channel in the Superior Part. The Brim of the Acetabulum is not equally high all round, but is defective in bone towards the great Foramen, or lower, and rather on the Anterior part, which defect is supplied with a strong Ligament. The Acetabulum is deepened by having a Cartilage raised round the Brim. The Bones of the Pelvis allow of little or no Motion, and are firmly connected together by strong Ligaments, else the weight of the Abdominal Contents might seperate them. It has been said that the great Foramen was provided to suffer the little Trochanter to come near the Pelvis when we bring the Thigh to the Pubis, but it never appro:aches very near in any position we can put the Thigh in. We have now described the Spine and Pelvis, and shall in the next place make some general reflections on the latter. We can generally distinguish a Male from a Female Skeleton by the size and general strength of the bones; the Male bones are broader, thicker and stronger, than the Female, and bear more evident Marks of the print of the Muscles, but as there are strong robust Women and small Men, we are liable to be sometimes deceived. The Chest of a Woman has been said to be flatter, than a Man's because of the pressure of the Breasts, but this is rather Theoretical than from Observation: The Pelvis is the most certain Mark, by which to distinguish the Sex of a Skeleton, but in this too we may be deceived; generally

however

however
the Cavity of the Pelvis in Females is of a rounder figure and broader, tho' some Men's have this Shape also, but the appearance below is much more constant, the three points formed by the Os Coccygis and Ossa Ischia, are much farther distant from each other in a Woman than in a Man, the anterior Notch under the Pubis is much wider, and forms a much less acute Angle, and the great Sciatic Notches are much larger in the Female; the final cause of this large make of the Pelvis in a Woman is that these bones may be wide enough to let the Child pass thro' in Child birth, and they say that they open at the time of those pains we call grinding Pains; we cannot absolutely say, that it may not be so sometimes at the Symphysis of the Pubis, but they must open exceedingly little indeed — In examining many bodies, we shall scarce ever find a Cavity in the Joint of the Pubis, sometimes however it is found, and is now & then the seat of Inflammation and Suppuration — A Woman had a large Collection of Matter in this part, which diffused itself all round the Pubis within and without, and at last killed her, the Symphysis and part of the Substance of the Ossa Pubis were destroyed — To releive this Case at first a depending Orifice should have been made with a Lancet under the Pubis just before the Meatus Urinarius internally, because on the outside of the Pubis there is much Skin and Cellular membrane, and besides the Orifice would not be depending — By force the Ossa Pubis may be divided at their Symphysis, as was the Case of a Gentleman at Worcester; he was a heavy man and by a sudden turn of his Horse his thigh was drawn outwards, and by that means the Bones were torn asunder, and the Bladder ruptured, the Urine got into the Cellular membrane at the

bottom

bottom of the Pelvis, and he died. The Bones of the Pelvis may be distorted in consequence of their being soft in the same manner as the Vertebræ, and are most liable to it in women, who are by nature weaker than men. The Distortion is made in this manner, towards the Pelvis the Vertebræ of the Loins are convex, and the Sacrum is concave; now if the Bones are soft, the body pressing downward will bend the Lumbar Vertebræ inwards towards the Pubis, which is the reason why the distance between the Spine and Pubis is so little in all misformed Pelvises:— the large Surfaces of the Ilium pressed upon by the Viscera force that part opposite to the Acetabulum inwards towards the Sacrum, the Os Coccygis is bent round and its point turned upwards, because in sitting and lying down the pressure bends the Os Coccygis, and bending the Sacrum to the point of the former is inverted. In sitting pressure is made upon the Tuberosities of the Ischium, and the middle part between them and the Pubis giving way, they are forced upwards, and inwards. From softness of the Bones and pressure all the distortions in the several parts of the Pelvis are easily accounted for; as the Bones in these Cases are never of an equal softness, we may sometimes see very crooked Legs with a well formed Pelvis, and at another time a very distorted Pelvis with straight Legs. In the most common distortions of the Pelvis, it is made narrow from the Sacrum to the Pubis and the Cavity of the Pelvis is largest on one side by the Spine being forced away to the Other, as mentioned in the Distorted Spine with a second Curve. The Bones do not open sensibly to enlarge the Cavity to let

the head

the head of the Child pass in birth when it is very large. We might suppose that a Woman could not be delivered of a Child whose head was larger than the Width of the Pelvis, but the bones of the Head are so formed as to give way to pressure, the head becomes narrower & longer, and passes after a few hours severe Labour; in such Cases we should wait the Efforts of Nature, and we shall be surprized to see what wonderfull things she can do. If not hurt by the hand or Instruments a Woman will as certainly recover after three days strong severe Labour, as after three hours slight pains only before she is delivered. It is indeed sometimes necessary to pull the Child's Head away by pieces with the Instruments, where the Sacrum and Pubis are so near one another, as not to give the least hope of the Child's Head being capable of passing down, and sometimes it has happened, that they are so very near as to hinder even this being done, and the only means to be then used is to save the Child at least by the Cesarian Section. In the Case where Mr Thompson performed the Cæsarian Operation, the passage between the Sacrum and Pubis was but 7/8 of an Inch wide, so that it would have been fruitless, if they had attempted to pick the Child away, therefore the Operation was justifiable. We come next to the Bones forming the Thorax or Chest, which was so called because it serves as a Box or Case to hold the Heart and Lungs. It dilates and and contracts in Respiration, and serves as fixed points for Attachment to ~~of~~ many muscles; its Shape is Conical the small end being uppermost and there is an aperture in its upper part, thro' which the Œsophagus,

Trachea

The Bones of the Trunk

Trachea, and Blood Vessels of the Arms and Head pass — (the apparent Cavity of the Thorax contains some of the Viscera of the Abdomen.) The Thorax has on its fore part the Sternum, and on its sides the Ribs — the Description of these finishes the Trunk — A Rib is a crooked Bone, running from the Spine to the Sternum, the posterior part is called the Head, tho' it is not round, it goes in between two Vertebra with two Surfaces for Articulation with the Vertebra; that part of the Rib which is more bent than the rest (near its head) is called the Angle of the rib, it gives attachment to the Sacro Lumbaris Muscle, the upper edge is round and thick, the lower is made thin and sharp by a Groove in which run the Intercostal Artery, Vein, and Nerve — The Ribs are divided into two Classes; those whose Cartilages immediately join the Sternum, are called true Ribs, and are seven in number, the other five whose Cartilages do not immediately join the Sternum, are called false, or Bastard Ribs. The Spatia Intercostalia are greater forwards than backwards; The Ribs run inclining downwards from the Spine, and the lower Ribs incline the most; the distance from the Angle of the Rib to the Transverse Process increases downwards — The Anterior Extremities of the Bony Part of the Ribs recede farther from the Middle Line as they go downwards; excepting in the first rib where it is farther off than in the Second or third, and of course this Rib has a longer Cartilage. Note, the Cartilages and Bony part of the Ribs run in different directions — The Length of the Ribs increases downwards to the eighth, and then decreases again; the first Rib is the most crooked, and they become afterwards straighter, and straighter to the last — a Peculiarity in the first is, that its flat sides are upwards and downwards, because it lays on the top of the Lungs;

the flat

The Bones of the Trunk

the flat sides of the Ribs lay inwards and outwards, so that the flat side of all the Ribs are next the Lungs; The Subclavian Vessells make two flattened Surfaces on the first rib, where they pass over between it, and the Clavicle; the Artery before and the Vein behind — The two last Ribs are articulated with the body of the Vertebra, and not with their Transverse Processes — their Gristles are lost in the Flesh of the Abdomen The Sternum is situated upwards and backwards, it is divided into three Bones, or Pieces; the first & second called the Sternum, and the lower one called the Xiphoid Cartilage; it is partly Bone, and partly Cartilage and runs down on the Muscles of the Belly: there are two Cavities on the upper part of the Sternum where the Clavicles are articulated — The Second Rib has it's Cartilage always inserted between the first & second bone of the Sternum — In opening the Thorax in a dead body, after having seperated the Cartilages from the Ribs by cutting the Ligament and Periosteum, the inside of the Junction of the first and second bone, we can turn up the Sternum without the trouble of seperating the Clavicles ——

The Bones of the Trunk

Lecture 19th

The Motion of the Ribs and Sternum must be considered together; — they evidently serve for Respiration, and are moved by different Muscles; In proportion as the Ribs are raised, the Sternum is raised also, and the Cavity of the Chest enlarged, during this Motion the heads of the ribs rotate a little on the bodies of the Vertebræ, and None of them have Epiphyses, which is somewhat remarkable; From the necessary Function of Respiration we see the reason why the Ribs of Children whose Mothers went their full time, are always Ossified at birth: for that the Muscles might raise and depress the ribs, it was necessary they should be inflexible; If a Child is born before it's proper time, the ribs sometimes are not perfectly Ossified, a remarkable Case of this kind Dr Hunter mentions: a Child was born at six Months, it's ribs were Cartilaginous and so soft, that the external Atmosphere pressed them inwards in Inspiration, by which means Respiration was so much disordered, as to occasion Death soon after — As the Ribs sustain no weight, they would not in general grow deformed, but distortion of the Spine must affect them because they are articulated with each other; When a Spine is distorted the Ribs on the convex side or on that from which the Spine is pressed are farther from each Other than naturally they are, on the concave side they are squeezed closer together, & on the convex side they are bent backwards & come over the bodies of the Vertebræ very near, indeed so as often to destroy that side of the Cavity of the Thorax, and shove the Lungs over to the Other side, which greatly obstructs Respiration: the hump or the most projecting part of the back is commonly made by this Angle of the Ribs, but sometimes it is made by the Vertebræ though we see the legs & Back of a Woman very much

The Bones of the Trunk

very much distorted, yet we must not conclude immediately that the Pelvis is so too, and that if she is with Child the Labour will be difficult, for it frequently happens that the Pelvis is well formed in such cases, the softness of the bones not being always general, but confined to some particular ones only; Almost all Distorted Persons seem to have a great length of Legs and Arms, because they originally proportioned to the height of the body would still have been so if the Vertebræ had not been compressed; Crooked Persons are generally sickly and short lived because the Viscera are compressed and greatly impeded in their functions. The high breast bone in a distorted Chest is occasioned most probably by the Heart's Action, pressing forwards for want of room, Cheselden says, the ribs of Children may be depress'd & broke inwards like a green stick without the broken ends being seperated, by the hand of their nurses in dancing them & hoisting them up on one hand, but in such Cases Dr Hunter thinks there is always a præternatural softness of the Bones. Binding of the ribs when fractured, or when Persons are Pleuretic must certainly give great Ease by obliging them to breathe with the Diaphragm alone, because the stretching of inflamed parts always gives great pain. It has been recommended to trepan the Sternum to let out matter when supposed to be collected in the Mediastinum, but this Case never occurs so as to make this Operation necessary, for the bag of matter must be broader than the Sternum, so as to extend beyond it's edge, else we cannot know that there is matter there, and when this is the Case, it may be let out without hurting the the Sternum: besides there is no Cavity in the Mediastinum. It has been said that the Xiphoid Cartilage may be broken off from the Sternum

Sternum, and that its point being turned inwards may occasion very bad Symptoms, but if it should be beat in, the pressure of the Viscera will soon replace it, and no mischief will ensue — From these reflections the bad effects of tight lacing are very obvious, the Chest will be pressed closer and its Contents faced downwards, on those of the Abdomen, which likewise are compressed by the Stays, so that Respiration must be greatly impeded, the consequence of which is more dangerous than commonly imagined. We have now gone thro' the Trunk, and shall next proceed to the Extrem:ities —

The Bones of the Upper Extremity

The Upper Extremity is composed of the Shoulder, the Arm, the Fore:Arm, and the Hand — The Shoulder is made up of two bones, the Clavicle forwards, and the Scapula backwards — The two Surfaces of the Scapula are called Regions, the inner called the Subscapular is covered with a large Muscle, called Subscapularis: the outer is divided by a large Spinal Process into two Regions, the upper called Supraspi:nal, and the inner called Infraspinal Region — The first is filled up by the Supraspinatus Muscle, the last by the Infraspinatus Muscle — The edge of the Spine gives origin to many Muscles — The edge of the Scapula all round has Muscles attached to it, & at the upper end is a notch with a Ligament stretched across so as to make it a hole for the passage of an Artery, a Vein, and a Nerve — the Glenoid Cavity is oval, and to afford strength to the Joint the neck of the bone is made thick — The Spine of the Scapula begins at the Basis, & runs on to form the Acromion immediately over the Os Humeri:

The Bones of the Upper Extremity

os Humeri: the Coracoid Process comes from the neck of the Bone, & goes round the fore & inner part of the Joint — When we lift our Arm above an Horizontal Line the Scapula rotates on its Center — The Clavicle is somewhat of the form of an Italic Letter S, at the under part of it, and near its anterior end, where it is articulated with the top of the Sternum, there is a considerable pit from whence a strong Ligament is stretched across to its fellow inwards — near the End arti:culated with the Acromion, it is flat upwards and downwards, and on the under side there is a Tuberosity from whence a Ligament goes to bind it to the Coracoid Process below — the great use of the Scapula and Clavicle is to allow a variety of Motions to the Arms by their swinging loosely; no other bone but the Scapula (the os Hyoides excepted) moves out of its place, and besides its moving forwards & backwards &c it has a rotatory Motion on its Center — the Use of the Clavicle is to keep out the head of the Scapula, & give the Joint a more advantageous situation for Motion in the Human Subject — The common Quadrupeds have not it as the Ox & Sheep — Mr John Hunter finds, that those Quadrupeds which sit upon their hinder extrem:ities, & perform various Motions with their fore feet have a Clavicle as Monkeys, Squirrels, & others of that kind — As the Clavicle is a very narrow bone, when it is fractured one end easily rides or shoves over the other end, to rectify this the Shoulders should be drawn back, and confined in that position — Between its Articular end and Sternum, there is a Moveable Cartilage; to prevent Dislo:cation of the Clavicle Nature has provided two uncommon Ligaments one running across to the Anterior end inwards & one from the Coracoid Process

Ion

The Bones of the Upper Extremity

In considering the Humerus, & all the other bones of the Arm & Hand we shall suppose them placed so as that the thumb be outwards, tho' that be not the most natural position of the Arm. When the Centers of the Cartilaginous Surfaces of the Head and cavity coincide, the Arm is in a middle position, between its greatest Elevation, & lowest pitch. On the forepart the Head is divided by a Groove into two Protuberances, the inner for the Subscapularis muscle, & the outer for the short head of the Biceps; The Groove receives the Tendon of the long head of the Biceps. There are many protuberances & impressions of muscles on this bone; toward the lower end on the outside the Surface is very broad & flat for the Brachaeus Externus, & on the inside too for the Brachaeus Internus; at the outer Condyle there is a roughness for the Attachment of the Extensor muscles of the Fingers, and at the inner Condyle for the Flexors of the Fingers: on the fore part there is a Cavity for receiving the Anterior Process of the Ulna, on the back there is another for the posterior Process of the same Bone. That part of the bone on which the Ulna moves is called the Trochlea or Pulley; & that on which the Radius moves is called the small head: at the Shoulder this bone performs all the different kinds of motion which should be very attentively considered; an the joint a Surgeon should have a thorough knowledge of, because it is greatly exposed to Accidents. The Arm has not so much motion as it is commonly thought to have, great part of what appears to be proper to the Arm being made by the Scapula. Dislocations of the Humerus are often very difficult to discover from other Alterations in the part. Dr Hunter related the Case of a man whose shoulder had been squeezed between two Carts. It was no easy matter to say what injury had

been done

been done to particular parts, but to find it out, he proceeded thus: I first (said he) felt for the Clavicle at the Sternum, then traced by degrees till I came to the Acromion, where I found the head of the bone not right, then from the Base of the Scapula I felt along the Spinal Process, & when I came just to the Acromion, there was plainly something amiss, the head of the Humerus was not only dislocated, but the Acromion was beat off from the Scapula and adhered to the end of the Clavicle sticking up in its right place, the Arm with the Scapula being unsupported fell down, which altered the appearance of the Shoulder entirely, but by raising up the Arm the Case was easily discerned. By this Mode of examining the Shoulder, the Dr says, we shall hardly ever fail finding out the real state of the Case. For dividing the Capsular Ligament of the Joint in the operation of Amputation, the Arm must not be turned upwards, because the Ligament will then be carried under the Acromion out of our way and we shall run a great risk in missing the Joint, but the Arm should be held close to the side, and then it will be divided with Ease & Certainty. The two great Marks by which we know that the Humerus is dislocated are these; first the head of the Humerus cannot be felt at the Shoulder immediately under the Acromion, but in its stead there is a kind of Dent or Cavity to be felt; Secondly the Arm appears crooked as if broken in the middle because some of the Muscles are drawn out of their place, while the Deltoid Muscle keeps its own Line.

Lect 20th

The Bones of the upper Extremity

Lecture 20th

In the fore Arm there are two Bones the Ulna and Radius which are Articulated with the Os Humeri — The Ulna is longer and Larger than the Radius, It has at it's upper End a long Process called the Olecranon, and on it's forepart there is another called the Coronoid Process, between these Processes is the Articular Surface that joins with the Os Humeri; on the Outside near the Coronoid Process is an hollow for the Radius to play in, down the Outside of this Bone a ridge runs for the Attatchment of the interosseous Ligament, at its Lower and forepart there is a Ridge for the Attachment of the Pronator Quadratus; To examine the Ulna for a fracture we must trace the Bone from the Olecranon downwards and backwards as the Bone can be felt all the way in that Direction, and not in any other, because on it's forepart and sides it is covered with Muscles

The Radius is smaller than the former, its upper End which is Articulated with the Humerus is called the Head, near this on the forepart (supposing as was said before that the Thumb is outward in the Position of the Arm and the Palm of the Hand directly forward) is a Tuberosity for the Tendon of the Biceps, down the inside of this bone a sharp Edge runs corresponding with that of the Ulna for the Attachment of the interosseous Ligament, and the lower Part becomes flat for the Attachment of the Pronator Quadratus, on the hinder part of it's lower end there are several Grooves which are found invariably the same in every subject in these Grooves run the Different Tendons of the Thumb and Fingers

The Radius is articulated above to the Os Humeri, and below to the Os Scaphoides and Lunare Bones of the Carpus —

The motion of the Radius at its upper end is round it's Axis and with it's lower end it describes great part of a Circle round the Ulna.

These

The Bones of the Upper Extremity

These bones make with the Wrist a Double Joint, which Nature has contrived to bring out a Variety of Motions. The fibres of the Inter-osseous Ligament run Obliquely upward from the Ulna to the Radius which is Admirably well contrived to prevent the Radius from being Dislocated upwards. When we bind up a fractured Limb, we should place it in a Middle State between Flexion and Extension, and the Arm between Pronation and Supination; All the Extensor Muscles going to the hand arise from the Outer Condyle of the Humerus, all the Flexors from the inner Condyle, that is, all those which go from the upper Part of the Arm, when the hand is supine they go Obliquely downward, when it is prone they go in a Direct Line downwards. The Hand consists of Carpus, Metacarpus, the Fingers and Thumb. The Wrist is composed of eight bones, which together make a tolerable uniform convex surface behind, and before unevenly concave. The Ancients described these bones as making two Rows. The Os Scaphoides and Lunare making an Oblong Head to join with the Lower End of the Radius, next to these is the Cuneiform bone, which has upon it internally the Pisiform bone; these four bones form the first rank; the second rank consists of the Trapezium to which the first bone of the Thumb is joined; next to these are the Trapezoides, Magnum, and Cuneiform Bones, to which the four Metacarpal Bones are joined; the Trapezium has a projecting part inwards, which with the Pisiform bone makes an hollow by means of a Ligament stretched from One to the Other, called the Annular Ligament, under this Ligament the Tendons run to the hand. We should remember, that if we draw a Line in our Minds from the Os Pisiforme to the Trapezoides, that we have the Axis of a Long Oval: Nature has furnished such a number of bones in this part to allow of a great quantity of Motion

The Metacarpus consists of four bones, the Thumb being considered as having no Metacarpal bone; The Upper Ends of these bones are called

called their Basis, and have Cartilaginous Surfaces for moving on the Carpus backwards and forwards and a little laterally, their lower extremities called their heads are much the largest: the fore and Middle metacarpal Bones have but little motion, the other two have a great Deal, the middle one being nearly the Center of motion round which the other turns — The Fingers each of them consist of three Bones thickest at the Joints; they project but little back-ward, but a great Deal forwards — If we place the Fingers in their most natural State, that is half bent, the Projection will be equal, their bodies are flat before, and round behind, because the Flexor Tendons, which lay on their fore part are much stronger, than the Extensors which run on their back part, which was necessary because the Fingers only act when bent — Their Principal motions are those of Flexion, and Extension with a little lateral motion —

The ends of the last bones of the fingers are enlarged, and spongy for firmer attachment to the flesh that covers them; the same may be said of the last bone of the Thumb — The Thumb has three bones, and is made stronger than the Fingers, because it is the Antagonists to them all — The Hand is an exceeding fine Instrument expanding itself to a Plane, and contracting to a Ball and performs a great Variety of motions. Its motions are combined with others; thus for Instance to describe a Circle with the end of the finger conveniently, we move the Finger, the Hand, the Wrist, the fore Arm, and the Arm, so that we see nature has not only adapted each joint to its own proper motion, but also made it subservient to the motion of others —

So much for the upper Extremity, we proceed next to consider the Bones of the Lower Extremity; The Lower Extremity comprehends the Thigh, Leg, and Foot —

The

The Bones of the Lower Extremity

The Thigh Bone or Femur is articulated with the side of the Pelvis. It was absolutely necessary it should have this Position rather than being nearer the Central Line of the Body, because Room must be allowed for the Attachment of very strong muscles to move it, and the Thigh bones are no farther asunder than is necessary to lodge their muscles — When we stand with our feet together, the Thigh bones are situated obliquely to each other, and the Lower Surface of the Condyles makes an horizontal Line; the head of the bone is removed by the neck from the line of the body of it. It has a great articular Surface to move in the Acetabulum, and points Obliquely upwards and inwards; in the middle of the Articular Surface there is a Pit for the Ligament where there is no Cartalaginous Surface; near the neck of this bone is the great and little Trochanter, the first on the Outside projects at the Hip, and has the Extensor muscles of the Thigh attached to it, the second is on the Inside, and has the Flexor muscles of the Thigh attached to it; the body of the bone is pretty regular, on it's back part from the Trochanter downwards there is a rough line called the Linea Aspera, which at the lower part divides into two, one running to one Condyle, and One to the other. The head of the bone not being in a line with it's body, in flexion and Extension it only rotates, which oblique Position of the head makes this joint difficult to be understood. When the bone is fractured at it's neck, it is sometimes mistaken for a Luxation only, it is best distinguished by the grating of the fractured Ends of the bone — In a Dislocation of this bone from the Acetabulum, we must make Extension by pulling in direction of the neck of the Bone, that is downwards, and outwards, this is particularly necessary to be Observed when the head of the bone

is

is thrown into the Groin and its neck rests upon the edge of the Pelvis — Dislocation at this Joint seldom happens, but when it does, the head of the bone may be found in every Part round the Acetabulum. — It is exceedingly difficult to form a proper judgement in these Cases. We should attentively consider the Position of the Leg in general, whether the Toes are turned inward or outward &c — A very common Deception in regard to Dislocation is when One Limb is shorter than the Other; but we are not to consider the shortness of one Limb as a proof of Dislocation, for that may be owing to One Hip bone being raised higher than the other. — It may also be caused by a Humour falling on the joint, and in this case there is often great Pain in the Knee, which has caused the Disease to be mistaken for an Affection of that particular part. —

The Bones of the Lower Extremity

Lecture 21st

The Weight of the Body does not press directly on the body of the Thigh bone, but on it's head, so that if this bone be softened by the Ricketts, the head of it will be pressed down sometimes as low as the Trochanter, and the body of the bone being naturally curved forwards, it takes an Incurvation in that direction. — Bones are weaker in proportion, as they are smaller, therefore when the Thigh bone is fractured it is commonly about it's middle. — A Question has been proposed, and chiefly by the French Surgeons, whether or not Amputation is practicable at the Joint of the Hip? As to the Possibility of performing the Operation there dont seem to be much doubt, but the great Loss of Blood, and the great discharge which must necessarily ensue from so large a Wound will make the operation generally fatal. — The Leg is made of three bones, the Tibia, Fibula, and Patella; The Fibula is situated outwards, and backwards, a Process of it makes the outer Ancle. — The Tibia on its upper Articular Surface has a middle bifid Protuberance corresponding with the notch in the Femur, and behind there is a rough Groove for the attachment of the Cross Ligament of the Joint that sets bounds to its motion; below the Articular surface and on the fore part of the bone is a considerable protuberance for the attachment of the Patella by means of a strong Ligament. — In Amputation we must saw off the Bone below this part to avoid destroying the insertion of the Extensors of the Leg. — The Body of the bone has three surfaces, the inner one of these is

is the seat of the Nodes in the Venereal Disease; on the upper and hinder part is a Ridge for the Popliteus, and Soleus muscles; on its inside is a small dent for the Fibula, and at the lower end on the outside there is a concavity for receiving the lower end of the Fibula. A Process of this bone forms the inner Ancle. — The Patella may be considered as an Appendage to the Tibia; the upper part of it is called the Basis, the lower the Apex; to the Basis are fixed all the Tendons of the Extensors of the Leg, to the Apex is attached the Ligament of the Tibia. — The Joint of the Tibia with the Femur admits only of Flexion and Extension, except when the Leg is but half extended, for it has then a small Rotatory Motion; because when the Leg is quite extended, the Cross Ligaments behind are tight, and confine the bones strictly together, but when it is half bent the Ligaments are loose, and allow the bones to rotate a little. — In a transverse fracture of the Patella the Basis was thought to be seperated from the Apex by a Jerk of the Muscles, in the same manner as the Tendo Achillis is fractured. — Dr Hunter relates the case of a Man who was passing thro' Holbourn with a Burthen on his head, and fell backwards, his Patella was fractured in the fall, tho' the knee did not touch the Ground; this was supposed to be caused entirely by the Action of the Muscles, but the true Reason is this, when the Leg is in a middle state between Flexion and Extension, the Patella rides on a transverse Cartilage, and so by any sudden Jerk is snapped in the same manner as we break a stick across the Knee — When the Patella is fractured, the Cavity between the fractured end, and that of the Joint communicate. —

The

The Bones of the Lower Extremity

The Fibula is every where marked by muscles, which cover it in the middle externally so as to hide it from the feel, but at its ends it may be felt Distinctly: at its lower end is a ridge externally for the Tendon of the Peronæus longus to run behind — In Subjects with soft Bones the Tibia and Fibula may from a Variety of circumstances be crooked in any direction, but the Femur lying on the Tibia rather behind, they are commonly curved forwards; just below the middle of the Tibia is the Weakest part, where fractures most commonly happen and when the Bones are soft it first gives way at that part, but not till the Child begins to walk. — The Foot like the Hand is composed of three parts, the Tarsus, Metatarsus and Toes, the most natural Position of the Foot is with the Toes directly forwards: the foot is hollow below, narrow behind, and broad forwards; between the heel and ball of the foot it forms an Arch, and the bones underneath are firmly bound together by Ligaments to keep the Arch from being press'd in; the use of the Arch is to secure the muscles, Tendons nerves, and Blood Vessels from pressure, and make the foot much more stable, it also prevents the Body from being so much jarred in Walking, Running &c as it otherwise would be. The Toes are pressed on when we walk, and in some measure support the body till we are quite fixed on the other Foot. — The Tarsus is composed of seven bones, first the Astralagus (which forms the top of the Arch) is adapted to the two Bones of the Leg above, below it is connected with the Os Calcis, and before to the Naviculare —

The Os Calcis has below and behind tuberosities for the attachment of muscles and Ligaments, at its very hinder part the Tendo Achillis is fixed, between which and the Astralagus there is a Space filled with Fat, and on the outside of the Os Calcis there is a

a Groove for the Tendon of the Peronaeus longus; the five other bones of the Tarsus make the Instep, and are connected together by strong Ligaments. — Before the head of the Astralagus is the Naviculare, before the Os Calcis is the Os Cuboides; the other three are called the Ossa Cuneiformia, the Internal, Medial and External: to the Internal the Tendon of the Tibialis Anticus is attached; the other two are hardly seen in the Arch of the foot; All these bones have considerable Motion with One an Other, as those of the Wrist have, and to the lower end of them the Metatarsal Bones are fixed. — The Toes are so similar to Fingers that they need no particular description. — at the Root of the great Toe there is a Bump call'd the Ball of the great Toe, upon which we principally press in standing, and walking; We call that the first Phalanx of the Fingers and Toes, which is next to the Metacarpal or Metatarsal Bone —

The Astralagus has so much cartilaginous surface, that if a Caries attacks it, the Joint is almost inevitably lost; We observe that the Heel goes back considerably, which is to form the larger Arch, and Allow more convenient attachment to the Muscles of the Calf of the Leg) in proportion as the Heels of the Shoes are high, we walk with greater Disadvantage; Women who wear high Heels have always their feet distorted. The most natural Method of walking seems to be with the Toes directly darting forwards, as the Indians in America walk — As the Spine, Pelvis, and Bones of the lower Extremity support weight, they are commonly bent when they are soft from a deficiency of the Ossific Matter, but as all Bones are not soft in equal Degree, there is no One bone so certainly affected in this kind of Constitution, but that it sometimes retains its proper shape

shape when Almost all the others are distorted. — The Bones of the Arms are seldom distorted, because they support no Weight, but sometimes it happens from their being leaned on, that they become crooked also. — We have now finished the Trunk, and upper and lower Extremities, and shall next proceed to describe the last Part, the Head, which we consider as an Extremity —

The Bones of the Head in General

Lecture 22d

It has been the general method in Demonstrating the bones of the Head to consider them seperately, but this Dr Hunter thinks is wrong; he says the Head may be compared to an House or Cabinet in which there are several different Apartments, and asks who takes an House to peices to explain it? He proposes then first to consider the bones as they appear externally in their natural Situation, and afterwards by making use of different sections to shew their Appearance internally — The Head is divided into two parts, the Scull, and the Face, and this last is subdivided into three, the Forehead, the upper and the lower Jaw. The Cranium is of an Oviform Figure, but it's Axis drops downwards, and backwards, so that if we conceive a line to be drawn horizontally forwards from the lowest part of the Axis, and an other let fall perpendicularly on it from the fore part of the Axis, these two lines with that of the Axis will form a Triangle, in which is contained the bones of the Face — The Cranium is commonly divided into the upper part or Arch, and the lower part, or Basis: the most remarkable things to be observed in the Arch are first the seams or sutures, which are five in number, the Coronal, Sagittal, Lambdoidal, and the two Squamose; The Coronal suture runs across the Head and terminates on each side near the most projecting part of the Orbit; as it crosses the head it runs backwards. — The Sagittal Suture runs from the most projecting Part of the Hindhead to join the coronal suture, sometimes it is continued down the forehead where it is called

called the Frontal. — We must next observe the five points in the Scull where it is more prominent than Else where, two on the forehead which in some measure give it it's shape, one on each Parietal Bone, and one behind on the Occipital bone; these projections on the surface of the skull have been a long while accounted for by Mr John Hunter, who says that they are the first points where Ossification began, retaining their original form of the Segments of a Circle, while the other part of the bone expands into a larger from the Ossification shooting quamquaversum till the whole is formed; accordingly we find that they are the Central Parts of the Bones; on each side of the Skull laterally there is a semi-circular line, which shews the Attachment of the Crotaphite or Temporal muscles. — These are the external appearances on the Arch of the Skull; we shall next take a View of the Basis externally, having first removed all the Bones of the Face the Basis is very uneven; just over the nose on each side of the forehead there is frequently a considerable projection, under which lies the Frontal Sinus, and at the upper part of the Orbit there is a ridge which continued laterally unites with the Zygomatic Process; a little farther back is the Zygomatic Process beneath whose Root is the Cavity for the Condyle of the lower Jaw, behind the Condyle is the meatus Auditorius, and behind this is a remarkable Process going forwards and downwards, called the mamillary Process to which many muscles are attached; behind the mamillary Process is a ridge called the transverse Occipital ridge for the Attachment of the muscles moving the head back-wards — The Basis of the Skull naturally divides itself into

three

three Parts both internally and externally; the first comprehending so much as reaches from the Eyebrows to the back part of the bones of the upper Jaw; the second reaches from the termination of the first to the Mamillary Process, and the third is all that Part between the Mamillary Process and the Occipital Ridge — The Middle Part of the first portion forms the back part of the Nose, the lateral Parts make part of the Orbits, and backwards is a Muscular surface for the Attachment of the Muscles of the lower Jaw — The Middle Part of the Basis of the Skull we shall divide into three parts, the Middle and the two sides; in the Middle lies the Cuneiform Process of the Os Occipitis; in each of the lateral parts we may observe under the Zygomatic Process an oblong Cavity for the Condyle of the lower Jaw next the Meatus Auditorius, and behind this is the Styliform Process where the Muscles of the Tongue are attached, behind and without this Process is the Mamillary or Mastoid, at the Root of which posteriorly there is a Groove where the Digastric Muscle is attached; within this is a Muscular surface for the Attachment of the Rectus Lateralis and near this is the Occipital Condyle which is articulated with the Atlas — In this part are several Foramina, near the oblong Cavity for the Condyle of the lower Jaw is the Foramen Ovale thro' which the Nerves of the lower Jaw pass; just behind this is another Foramen for the Carotid Artery; behind this is a large Foramen for the passage of the jugular Vein, and on the inside of this is another for the ninth pair of Nerves just over the Occipital Condyle; behind the Occipital Condyle is another for the Portio Dura of the seventh pair, and just by the Cuneiform

Process

The Bones of the Head in General

Process of the Occipital bone is the Foramen lacerum, which is not an important part serving no particular purpose as we know of, as it is principally filled up with Cartilage; these Foramina are all contained within or formed by the Pars Petrosa of the Temporal Bone; just within the Ear then there are Foramina for the great Artery and great Vein of the Head, both of these are attended with large Nerves, the Par Vagum which accompanies the Vein, and the Intercostal which runs with the Artery, so that if a Bullett be shot in at the Ear, it will destroy all these principal parts, and produce instantaneous Death, supposing it goes directly forward in a Line with the Other Ear; the third part, as said before reaches from the mamillary Processes to the Occipital ridge, it contains nothing material except the great Foramen ~~of~~ for the Spinal marrow; — Mr John Hunter is of opinion that the Mental Intellects do not so much depend on a proper mode of Education, as the quantity of Brain which the Skull contains; as a proof of this he says there appears to be a regular Series of Gradation in the size and shape of the Skulls from an Europeans to a Dog's; A Negro's Skull is not nearly so capacious as an European's, it is flatter, and the bones of the face are longer: A monkey's Skull is flatter and less capacious than a Negro's; and a Dog's Skull is much shallower than a monkey's, and the bones of the face much longer. Mr John Hunter says several Gentlemen from the West Indies have told him, that they have observed the Children of Negroes are very slow in acquiring knowledge in comparison with those of Europeans, tho' they went to the same School and partook of the same Advantages in common with the Children of Europeans — There are on the Skull

and

and Basis externally some Foramina scattered up and down; On the Parietal Bone near the Sagittal suture there is sometimes a Foramen on one side, and sometimes on both, but these kind of holes being at one time found, and at another not, shews them to be of no consequence, and behind the Occipital Condyle there frequently is, and frequently is not a considerable Foramen. — The Arch internally has nothing very material, it has a number of inequalities made by the convolutions of the Brain, and there are branching Grooves on it's Surface made by the Vessels of the Dura mater, particularly on the parietal bones; at the lower part of the Forehead there is a ridge for the Attachment of the Falx, and Longitudinal Sinus, which as it runs backwards becomes a Groove for the Vein or Sinus. — The Brain above is tolerably uniform, divided into two Hemispheres; below it is irregular with the Cerebellum lying under and behind it —
As we did externally, so we divide the Basis of the Skull internally into three divisions; the first from the forehead to the anterior Clynoid Processes has forwards, and in the middle the Crista Galli; and on each side the bone is convex answering to the Orbit underneath; and behind this the bone is concave to receive the middle lobes of the Brain comprehended in the second Division, so that these Lobes lye immediately behind the Orbits, and a Ball fired in at the Eye will pass under the Anterior Lobes directly into the middle one; in this middle division is the Sella Turcica formed by the Anterior, and Posterior Clynoid Processes backwards to the part corresponding to the Occipital Ridge. — In the middle on the Cuneiform Process of the Occipital bones is an hollow gently slanting backwards

and

and downwards for the Medulla Oblongata and beginning of the Spinal Marrow just before the great Occipital hole; behind the Occipital Hole is a Ridge running transversely for the Attachment of the Membrane dividing the Cerebrum from the Cerebellum — and underneath this are small inequalities made by the latter.

As there is a Sinus or Vein on the superior part of the Skull — between the Hemispheres, so there is a Sinus or Vein between the Cerebrum and Cerebellum, which forms the Jugular Vein near the Pars Petrosa. — The external Mark of Division between the Cerebrum and Cerebellum is the transverse Occipital Ridge —

The Bones of the Head in General

Lecture 23d

Having described the Skull we shall next describe the Face. — The Face is divided into fore head, upper Jaw, and Lower Jaw; the first division or forehead has already been noticed, is part of the Arch, of the Basis of the Skull; in the middle of the first division is the Root of the nose, and in the sides are the Orbits. — In the second division are the nostrills; these are open cavities externally, the end of the nose being wanting in the Skeleton; below these are the Sockets for the Teeth, and here the breadth of the bones of the face is much contracted. — In a side View the Cavity for the Passage of the Crotaphite muscle appears, the Cheek bone and Zygomatic Process uniting and forming an Arch over it. call'd the Jugum: the Use of the Jugum is commonly said to be to confine down the Crotaphite muscles, but it is not, it is to allow convenient Attachment to a very strong muscle that pulls the Lower Jaw upwards, the Masseter muscle. It is this Jugum which gives the Breadth of the Face, and in consumptive People when great Part of the Flesh is wasted, its form is seen distinctly. — By the Facies Hippocrata is understood the Skeleton of the Face. — If we next take a View from the mouth the bones appear much contracted and more simple Structure nothing more appears than the bony Roof of the mouth, and Sockets for the Teeth: at the ends of the upper Jaw are two little Processes with a hollow bony Surface between them called Fossa Pterygoidea, the inner of these Processes has a little bony hook called therefore the Unciform Process round which the Circumflexus Palati muscle plays. — Looking from behind we see the Posterior nostrills, which communicate with the

anterior —

anterior, and to divide the right from the left Nostril there is a Septum: The Nostrils run under the Basis of the Skull; the third part or Lower Jaw runs and backwards widening as it goes for Muscular attachment and Articulation. The Cavities of the Face as they appear externally are in the first place the Orbits; the circum-ference of these is rather Oval and the cavities point forwards and outwards to enlarge our Sphere of Vision; the long Axis of the Oval does not correspond with each Canthus, for if the Axis of both were extended they would meet in the Forehead at a right Angle: internally they go over the Maxillary bone; in shape the cavities are funnel-like, and perforated at the bottom, where they are nearly at the same Distance from each other, as they are across the Nose; externally there are two Foramina, on the edge of the Orbit, one on the upper edge, which is commonly only a Notch, called the Foramen Orbitale Superius or Superciliary hole; thro' it a Nerve Vein and Artery pass to the forehead: the other is called Foramen Orbitale Inferius, it begins under the lower edge, and running backwards opens into the bottom of the Orbit; there is a hole of great conseq-uence to be known just within the Orbit, thro' which the Ductus ad Nasum goes to convey the Tears from the Lachrymal Sac into the Nostril. At the bottom of the Orbit are three considerable holes, One above towards the Nostril call'd Foramen Opticum for the passage of the Optic Nerve leading to the Sella Turcica and is quite round, whereas the other two are irregular holes or Slits called Foramina Lacera. The Foramen Lacerum Orbitale superius is more outwards, and lower than the Foramen Opticum

and

in dentew the Cavity of the Skull; The Foramen Laceum Orbitale Inferius is on the outside of this, and does not lead into the Cavity of the Skull, but runs downwards and backwards between the bones of the Skull, and Upper Jaw; so much for the Orbits.

The internal Cavity of the Nose is divided by a Septum made partly by bone, and partly by Gristle running from the Root of the Nose at the Basis of the Skull to the roof of the Mouth and is a Continuation of the Crista Galli; on each side of the Septum, the Air passage is very irregular, made of three bones, the Os Turbinatum Superius, and Inferius whose lower edges are loose and unconnected, and the third is the Cellular substance of the Æthmoid bone. The Use of all these projecting parts is for the Expansion of Sneider's membrane to make a greater surface for the odorous Effluvia to be applied on in smelling; in the Dog whose smelling is very acute the Membranous Surface is larger than ours, besides the Turbinata there are many other projecting Lamina in his Nostrils. Besides the Nostrils there are large cavities communicating with the general cavity of the Nose call'd the frontal, maxillary, and Sphenoidal Sinuses; the situation of the Frontal Sinus is known by an external rising at the bottom of the forehead, it is formed by the outer, and inner table of the Skull seperating; answering to the Diploe, and at its lower part it communicates with the Nose near the great Canthus of the Eye generally by a small Orifice on each side seperated by a middle partition, tho' sometimes there is no partition;

partition; the Maxillary Sinus or Antrum of Highmore is situated between the Orbit and Sockets of the Teeth; it communicates at its upper part with the Cavity of the Nose near the same place as the Frontal does, and lies over the Sockets of the grinding Teeth. — The Sphenoidal sinus is the smallest of the three, and is situated just under the fore part of the Sella Turcica in the Basis of the Skull, divided into two by a partition in a line with the Septum Narium, and opens into the cavity of the Nose anteriorly close under the Basis of the Skull. — All of these communicate with the Nose by an Opening belonging to each, not larger than to admit a knitting Needle when their proper coverings are on. — The Manifest Use of the Skull is to protect the Brain, it is made up of several peices joined by means of the Sutures: — We have said before that generally there are but five Sutures, the Coronal, the Sagittal, the Lambdoidal, and two Temporal, and sometimes the Sagittal is continued down the Forehead, and makes another called the frontal Suture; the reason why this last is so, is this, originally, while the bones are forming there is a Seam dividing the frontal bone into two distinct Ossifications, which seam is generally Obliterated, but sometimes it remains when the bones are perfected; The Sutures on the Outside of the Skull are irregular, on the inside they are pretty regular therefore they are made principally by the outer Table. — The Temporal Sutures differ from all the Rest, they are not indented or dovetailed, but overlaying and called squamous. — Some Authors say there is a Middle Seam down the Occipital bone continued from the Sagittal but none is ever found, and seems rather advanced from Theory than from Observation, for the Occipital bone is Originally

one

one Ossification only beginning in the middle — There are Ossa Triquetra called also Wormiana; these have two sutures surrounding them; Originally they were new Ossifications set up by nature to perfect the general Mass of the Cranium sooner, they are commonly seen in the Lambdoidal suture but every now and then may be seen in any Others. — Hippocrates and since him many Others have warned us not to mistake a suture for a fracture. — An Anatomist will generally distinguish them by knowing the situation of the sutures, but he may be deceiv'd by the suture of a large Os Triquetrum. — A Suture has however always an appearance very different from a fracture, for a fracture seldom runs in so Zigzag a Manner as a Suture does, besides when the head is scalped we can easily remove the Pericranium from any other part of the Skull except at a Suture, and at the insertion of the Crotaphite muscles, where it adheres very firmly. — In Trepanning we need not avoid a Suture merely because it is a suture, but because there are parts that lie under them which we wish to avoid, and at the suture the sawn piece of bone cannot be easily taken out because of the firm Adhesion of the Dura Mater to it. — The Use of sutures has not yet been satisfactorily accounted for. — In a Fœtus they are membranous and allow the bones to overlap one another in birth, so that the head becomes less and passes more easily — If the bones be put into this form by force or by forceps &c the Child will be much hurt, but if it be done by the pains and efforts of the Mother, it does not hurt the Child at all — When a Child is born the Occipital bone is found often thrust under the Parietal bones, which is called by nurses an Horse shoe head, and often the Frontal bone is found thrust under the Parietal bones, which

which by them is called a mould shot head, these Appearances are apt to be very frightening, and are thought very material, but they are of no consequence, for in a little time the bones come right again. Why the other sutures remain open after the Fontanel is closed, we dont know. The sutures have been supposed to be outlets to phlegm from the Brain, and that when closed too soon, they are the cause of Juvenile Head Ach, by retaining the humour within the cavity of the Skull. In Old People they are often obliterated, and sometimes in Young; they are also said to be provided for preventing a fracture extending any considerable space on the Skull, as otherwise it might have done, but a fracture often crosses a suture, and if it reaches to a suture it hardly ever stops without crossing it.

The Skull is more or less spongy within, and compact on each side, so that sometimes there is more, sometimes less of the Diploë. The thickness of the Skull is very different in different people, in Women it is thinnest, and in them sometimes in particular parts it is hardly thicker than brown paper.

The Bones of the Head in General

Lecture 24

The last part of the Face we have to describe is the lower Jaw; the lower Jaw is originally two bones or peices, which are afterwards united at the Chin and perfectly Anchylosed in an Adult; on the Inside near the Symphysis of the Chin are two cavities in which the Digastric Muscles are inserted, and opposite the Symphysis near it's Basis the Genioglossi are attached. On the internal part of the lower Jaw at it's Angle is a muscular surface for the Pterigoidaeus externus which pulls up the Jaw; below the semilunar notch made by the Condyle and Coronoid Process externally is a hole which runs slanting thro' the bone, and terminates externally by a hole under the second grinder, being reflected backwards before it terminates; thro' this Canal a large Artery, Vein and Nerve pass to the lower Lip; the lower edge of the under Jaw is called it's Basis, and is pretty smoothly rounded; backwards it has two Processes, one for muscular attachment called the Coronoid Process to which the Crotaphite muscle is attached very advantageously for Action; the other process forms the Condyle for the Articulation of the lower Jaw with the Skull. The Condyle has it's articular end turned forwards, and it's inner end thrown back, so that the Axis of both Condyles make an Obtuse Angle with One Another. The Motion of the lower Jaw is by the Chin going upwards and downwards, so that the mouth when open forms two sides of a Triangle. The Center of Motion is in the Neck of the bone below the Condyle. In opening our Mouth the Condyle moves forwards till it is stopped by the eminence before the Articular Cavity, and sometimes in Yawning or otherwise opening the Mouth very

very wide, it happens that the Condyle slips out of the cavity over the eminence, the Jaw is then said to be Dislocated, the mouth is open and cannot be shut, and the Condyle lies under the Jugum to reduce this dislocation we must draw the Condyle downwards and backwards, and when disengaged it will slip into the cavity of itself for the most part, or we may push it backwards after disengaging it; it generally goes in with a convulsive motion of the muscles of the Jaw, and catches the fingers if something is not put into the mouth to prevent it. another motion which the lower Jaw has is the grinding lateral motion, which is made by bringing one of the Condyles forwards, while the other remains fixed, so that the Teeth rub on each other. the Condyle then plays not only in the cavity but on the eminence also. We are next to speak of the Foramina of the Skull. The Brain is lodged in the Skull, from which go off nine Pair of Nerves (old anatomists say ten) But the tenth Pair properly belongs to the Neck proceeding from the Spinal marrow; the nerves are reckoned from the back to the forepart of the Skull; thus the most Anterior are called the first pair, the next in order the second Pair, and so on. For the transmitting of these nerves there are Foramina, and also others for the Carotid and Vertebral Arteries of the Dura mater. we shall pass over several small Foramina, which are mentioned in different Authors, as being of little Importance. Just before the Crista Galli is one azygous hole called the Foramen Cæcum, which transmits a small Vein that makes the Beginning of the longitudinal sinus; on each side

side of the Crista Galli are a number of very small Foramina in the Ethmoid bone through which the filaments of the first pair or Olfactory nerves pass into the nose to be distributed upon Sneider's membrane. The second pair or Optic nerves pass each of them thro' a round hole on the Anterior part of the Sella Turcica, and go to the Globe of the Eye. The third and fourth Pair and one Branch of the fifth Pair with the sixth Pair all pass thro' the Foramen Lacerum Orbitale superius; the third pair are called Motorii Oculi, the fourth the Pathetic pair, the branch of the fifth pair and the sixth pair all pass thro' this hole; the fifth pair produces a number for the face, the trunk makes three principle ones, the first (which passes thro' the Foramen lacerum as was said before) goes to the upper part of the face, the second to the Upper, the third to the lower Jaw, the second branch passes thro' the Foramen Rotundum to the Nose, upper Lip &c. the third is called the Inferior Maxillary nerve, it passes out of the Skull thro' the Foramen Ovale down behind the bones of the Face, then goes into the hole near the Angle of the lower Jaw internally and runs along the Canal till it comes out forward near the Chin externally; the next in Order is a small Foramen for a little Artery of the Dura Mater, that passes thro' the Os Sphenoides near the Foramen Ovale. The next is a large Foramen in the Pars Petrosa of the Temporal Bone for the Passage of the Carotid Artery, from the neck it enters upwards and forwards, and when it is got into the cavity of the Skull it climbs over the side of the Sella Turcica up to the Optic nerve; with the Carotid Artery passes a twig of the Intercostal nerve. All these Foramina lie before the Sella Turcica, and Ridges made by the Temporal Bones. The next Foramen is for the Seventh Pair, or auditory nerves, in the posterior part of the Pars Petrosa of the Temporal Bone it

divides

The Bones of the Head in General

divides into the Portio Dura, and Portio Mollis; the Mollis winds thro' a cavity in the Ear, the Dura goes down near the Styloid Process, and makes the cutaneous nerve of the Adjacent parts; the eighth pair or Par Vagum goes through a hole common to the Temporal and Occipital bone, where the Sinus goes out to form the internal Jugular Vein; the Ninth Pair or Gustatory nerves go thro' the Foramen by the great Occipital Foramen over the Condyles. — The Vertebral Artery enters the Skull by the great Foramen Occipitale, and thro' a hole on each side of it; the nerves commonly called the Tenth Pair pass thro' this hole also — Having now done with the description of the Skull and Face, we shall now make some reflections thereon. — The word Diploë strictly speaking signifies a Doubling, but it is understood to be the spongy part between the Tables of the Skull — In every skull we may observe that it is wanting in some particular parts, and in no Skull it is entirely wanting, so that the common Rule to go on boldly in trepanning till we come to the Diploe is of no Service, because we can never be certain of meeting with it. — It is surprising how exceeding thin some Skulls are, particularly of women, and more especially about the Temporal Bones. — The Trepan may be applied to any Part of the arch of the Skull, but Surgeons chuse to avoid the middle of the head because of the Ridge and Groove for the Sinus Longitudinalis, which cause a very troublesome Hæmorrage if wounded. The frontal Sinus should also be avoided, because much pain is caused by the Air getting in and disturbing the Dressing, and besides the bone internally is unequal; the Trepan must not be applied on the lower anterior part of the Parietal bones, neither must it be applied near the Mamillary Process of the Temporal bones

bones, because of its internal inequalities. — A Fracture and Depression of the Skull may be of two kinds, In the first case the Bone may be broken as a green Stick is sometimes broken, that is broke thro' on one side, and only crushed on the other, in the second case it may be broken entirely thro', and in this last case we can seldom raise the bone with the Levator without making more than One Opening, because the broken piece of Bone generally carries a Shell of the internal Table making the fracture on the inside much larger than on the outside — Every One knows that there is a great Variety in the different shape of Skulls. — Sometimes we see there is naturally very great Depressions on the Skull, which might tend to deceive an Incautious Observer therefore we cannot be too careful. — the Size of the Skull answers to the Brain except that in Rickety Persons it is larger, the human part of the creation has more Brain than the Brute, undoubtedly because the Faculties of sense in a man are more extensive than in a Brute, Amongst monsters of the human race nothing is so common as a Foetus without a Brain, and consequently without a Skull higher than the Eyes, while in the Uterus it gives evident signs of being Vigorous and lively, that is while it is in a state nearly allied to vegetation, but when born tho' plump and fine it dies immediately with a Gasp, so that the functions of the Brain are not necessary to the more vegetative part in Utero, but are afterwards to the living part. — Within the substance of the Brain is naturally a little moisture, if this is collected and Accumulated, it makes a disease called the Hydrocephalus or Watery head various Symptoms are the Consequence, Fever, Delirium, and often Death itself; if this disease does not come on till the Child is three

or

or four years old, there is no appearance of it externally, that is the Skull is not enlarged, but the Brain is pressed between the fluid and the bone, so as to make some parts of it near as thin as paper; If it attacks very young Children, the sutures are often enlarged, or opened to a surprizing degree, and Nature endeavours to fill up these by new Ossifications. — We can tell when this Disease is present in the Fœtus by feeling in Utero a kind of bladder, and if the Water is let out the Patient immediately dies, because the Sides of the Cavity cannot collapse; if the Child lives it is commonly more or less stupid from the Compression of the Brain. —

A remarkable Instance of this kind was a Girl, who lived till she was almost thirteen years of Age, her head was of a surprizing Size, and she never had the least Use of any of her senses, if we except feeling which she seemed to enjoy only in a very low degree. —

In the Os Frontis over the external Angle of the Orbit is a little hollow, in which the Lachrymal Gland is lodged, and over the internal Angle is a Pit to which the Trochlea is fixed. — The Frontal Sinuses are not found in young Creatures, but as we grow up they are gradually formed, and at 25 years of age they are quite formed; The frontal bone makes a part of the Ethmoid Cells. — Writers on the Diseases of Breasts say, that there are sometimes Worms in the frontal Sinuses, which cause very trou-blesome Symptoms. — But how can they get there? for we never find any Snuff in the frontal Sinuses of dead People, who used to take it while alive. — The Frontanel is a want of bone at the corner of the two pieces of frontal bone principally, for the Parietal are very little concerned in it; By this we can tell the exact ~~[illegible]~~ situation

situation of the Child's head in labour, by examining the bone and the four sutures round it. — The Parietal bone is most frequently fractured, and may safely be trepanned, but at the lower and Anterior Angle there is a hole for the Admission of an Artery; which if divided may prove troublesome. — A Child when nearly born has that part of the head which presented a little thickned by the stagnation of the Juices from pressure. — Very commonly there Arises a hard tumor formed by the gradual oozing of the blood from a small Artery ruptured in the time of Labour, there is a feel on the edge as if the Skull was wanting, and the Brain pushing thro', and accordingly was supposed by the Ancients to be a protruction of the Brain. There is little Occasion to do any thing, for in time it will go away of itself, perhaps it may be two or three Months first, Mr Gooch recommends opening them, but it is unnecessary. — The Bones of the Orbit are so thin, that a pointed Instrument thrust into the Eye might easily pierce them, and do great mischiff to the Brain. The Occipital bone at it's posterior part has a transverse edge for muscular Attachment, internally it has two pair of cavities, the upper for lodging the Posterior Lobes Cerebri, the lower for the Cerebellum. This Bone is generally the thickest and hardest of any of the bones of the head, and it is said that it makes a small Arch to resist fractures; opposite to the Cerebellum it is very thin being a part of the Basis, and little liable to Injury. — The Part externally opposite to the division between the Cerebrum and Cerebellum is a little above the transverse Ridge. — The upper part of the

Ethmoid

The Bones of the Head in General

Ethmoid Bone is made of Cells that communicate with the general cavity of the Nose, and from these Cells hangs the Os Turbinatum Superius; the thinness of this bone shews us that an Instrument run thro' the Orbit upwards and backwards will easily get into the Brain, and so may a Probe run up from the Nostril — A Slender Instrument run up the Nose has thus perhaps been the Death of many Children, and a person might be murdered so without the cause of Death being found out. — A French Soldier had a Muskett ball lodged within his Skull for a number of years without the least Inconvenience, and upon opening the Skull after he died, it was found lodged exactly in the Sella Turcica. — Just behind and as it were between the two middle Incisor Teeth of the upper Jaw is a hole; which as it runs up divides into two, one correspon-ding to each side of the Septum Narium, the Use of it not known, for in general it appears entirely blocked up with membrane. The Antrum or Maxillary Sinus communicates with the Nose by a very small hole, and is often the Seat of Inflamm-ation and Ulceration the Matter makes the Bone carious and often eats thro' the Cheek, and makes a Tooth or two carious, so that if there is great pain under the Cheek attended with Inflammation, Surgeons should always examine into the state of the Grinding Teeth, for a bad Tooth may be the cause, and sometimes it is necessary to draw one tho' it be sound, and by running a small Drill up the Sockett they perforate into the Antrum with a View to give discharge to the Matter, and if

there

The Bones of the Head in General

there happens to be no Matter, it is of no consequence —

The Saccus Lachrymalis lies in a cavity of the Os Unguis just with a Ridge on its surface, and from this is continued down the Passage for the Ductus ad nasum. — In the Fistula Lachrymalis if an Incision is made within the ridge down to the bone, the Sac will certainly be opened; to perforate this bone for the same Disease we must direct the perforation downwards — and inwards, for if we direct it immediately against the nose, we shall meet with the hard maxillary bone instead of the thin brittle Os Unguis. — The Ductus ad nasum opens into the nostril between the Os Turbinatum Inferius, and the maxillary Bone, but the Artificial Opening that we make is between the Os Turbinatum Superius, and maxillary Bone —

The Greek Anatomists imagined the Brain to be a watery — part, that it purged itself upwards by the sutures, and downwards by an anterior Passage thro' the nose, and a posterior Passage into the Throat; and Aretaeus supposed that the — great Discharge from the nose and throat in a Catarrh was a purging of the Brain thro' the holes in the Cribriform bone; but we know of no Passage from the cavity of the Skull into the nose or Throat. — The maxillary, Sphenoidal, and Frontal Sinuses open into the nostril under the Os Turbinatum Superius; there are several Opinions concerning their Use; some say they are to make a more complex and extensive cavity —

The Bones of the Head in General

cavity for smelling. — Dr Nicholls thinks they do not serve this Purpose, but that they serve to strengthen the sound of our Voice, as the cavity of a Fiddle strengthens the sound of that Instrument, and therefore when the nostril is shut up by mucus, as in a Cold, the sound is not so strong; This is a very probable conjecture. Another Use they serve perhaps is that when the mouth is still in sleep, it would become dry were it not supplied with mucus from these cavities. —

Having now spoken of the whole of the Skull, namely of the Face, and upper, and lower Jaw, there remains still an Appendage to the latter to be taken notice of, which is properly to be considered as an external part, namely the Teeth —

The Teeth

Lecture 25th

As the Teeth differ from One another, we shall describe a Tooth in a general Way, and then mention the peculiarities of the several Classes of Teeth — The Number of them is different in different Ages, because they are shed and varied thereby; Generally there are sixteen in each Jaw, but sometimes the two or four farthest are wanting of the thirty two — as every Tooth has a part mark'd out of the Gum, and a part concealed within it, and as some Teeth have one, some two, three or four Fangs, on these Accounts we shall divide a Tooth into two parts, the naked part called the Body of the Tooth, the concealed part called the Fang, and the line between these we shall sometimes call the Neck of the Tooth, the very upper part of the body we shall call the Basis. — The Structure of a Tooth is best understood by viewing it's Center; if cut thro' longitudinally, we find a cavity within corresponding with the cavity in the body of the Tooth. — We see then that in every Tooth there is a cavity running from one extremity almost to the other; accordingly Anatomists have described an internal Periosteum lining this cavity, and they said that this Membrane was the Seat of the Tooth Ach — We see however no Membrane answering to their Description, but in the cavity, in young Subjects especially, we see a tender pulpy substance, which fills it entirely, and is very vascular as appears by injection, and from the similarity of this substance we may suppose it has nerves, tho' we cannot trace them. — The whole Fang and inner part of the body is made of a bony substance, the outside of the body has a hard Cortical substance, or Enamel covering it, which

which is of a very different Nature, and does not cover any part of the Fang — The whole substance of the Fang is bony, and is the most compleat bony substance in the Body; tho' it has the cavity before mentioned, yet it has none for marrow which all other bones have; this bony substance we cannot inject as we can other bony parts — which made Mr John Hunter be of opinion, that it is different from the other bones, but it has two of the Characteristics of Bone, in the first place by steeping it in an Acid, it is reduced to a flexible state, and secondly it is coloured by madder in growing animals that have been fed on it, so that we may conclude it does not differ materially from Bone — The hard, flinty, Cortical part of the Teeth the Enamel is still harder, so hard as scarcely to be touched by the finest tempered Saw; if we break it, we always find it breaks into Striæ like Antimony or sublimate mercury; it is evidently made up of Threads laid parallel to an other, as Radii from the bone of the Tooth, It takes a very smooth Polish like Ivory, and then it's thready Appearance is lost — The Enamel as far as we know is not in any Sense vascular, it is an inorganic concrete situated out of the Road of Circulation, and going no farther than the neck of the Tooth — If we steep a Tooth in an Acid, the Earthy matter of the bony substance will be dissolved, and the Vascular and combining part remaining, the substance will become flexible but the matter of the Enamel is All dissolved, and no Vascular or other part being left it crumbles into Powder; and what seems farther to prove that it is not Vascular is, that madder don't colour it in a growing Animal; — Anatomists say there is a Periosteum covering

covering the Fangs as far up as the neck of the Tooth within the Gum, but whether it is so or not is not certain, tho' there is now and then a vascular Membrane to be seen on them, which may be called the External Periosteum. — The Gums in a healthy State are united to the neck of the Teeth, and form a most beautiful Vascular Fringe next the Periosteum, which in most people seperate from the Teeth, as they advance in Life, and leave them bare and exposed. — The Teeth are commonly divided into three general Classes, for instance supposing there are 8 Teeth on each side of the Jaw, the two most forward ones are called Incisores, the next one called the Canine or Eye Tooth, and the remaining Five were called Grinders or Molares, but Mr John Hunter not thinking this Division sufficiently expressive, divides them into four Classes, the two foremost he calls Incisores, the next one he does not chuse to call Canine, because in Dogs, and other Carnivorous Animals it is a Tooth very different from what it is in the Human Jaw, he calls it Cuspidatus, or the Pointed Tooth; the next two Bicuspides, the three others he calls Grinders. — This last Arrangement we shall follow; The Character of the Incisores is that they are convex forwards, and concave backwards, having a sharp edge upwards, and one single Fang always; the Incisores of the lower Jaw are commonly smaller than those of the upper Jaw; when the mouth is shut, the upper Incisores are more prominent, than the lower, hence they wear each other away like the sides of a pair of Scissars, sometimes indeed there edges meet exactly, and then they wear down uniformly. — The Cuspidati are very long, convex internally and externally, and the two lateral surfaces next the other Teeth slanting upwards form a Point on the Basis, thence it's

name —

name, and it has a very long Fang, which sometimes running nearly as far up as the Eye in the Upper Jaw occasion'd its being called, the Eye Tooth. The Bicuspides are double pointed on the Basis, as the name expresses, they are the smallest Teeth in the Head, one point is on the external part of the Basis, the Other on the Internal, and on the Inside there is a Groove dividing as it were the Fang into Two, the cavity within corresponds with each knob or point on the Basis. The Molaris or Grinder is a broad thick Tooth, its Basis is of an irregular form having generally four knobs or points, two external, and two internal, and whether there be two, three or more Fangs, there is a Groove on each of them, but only One cavity in each Fang, and the last of the Grinders, which on account of its late production is call'd Dens Sapientiæ, has commonly but One Fang, and that being so short is the reason why it usually falls out the first of them. The Fangs of the upper and lower Teeth rest perpendicularly opposite to One another. Having now considered the Teeth as they are in a grown Animal, we shall next speak of their Use, Growth, and Diseases. The Use of the Teeth is evident, the foreteeth are for cutting and dividing our food, the back Teeth grind and mash it to pieces; As the uses of particular Teeth are very different in different Animals Naturalists commonly class them from their Teeth as being their most distinguishing marks.

The Use of the Enamel. There were commonly two Uses ascribed to the Enamel, In the first place it was said, that the bone is of that nature when exposed to Air, that it corrupts, and as the Teeth could not be conveniently covered with a Periosteum because it would have been rubbed to peices, therefore it was said that the bone is covered with an

an Enamel crust; and secondly it was said that the Enamel being much harder than the bony substance prevents the Teeth from being worn away so soon as they otherwise would have been without it — Mr John Hunter thinks that both these uses are accidental, for most old people have the Root of their Teeth left bare by the Gums, and yet we find that they do not become carious, and it is observable that the Caries generally first attacks the Body of the Tooth, where the Enamel covers it. It was said by Mr John Hunter to be given with this View; that in the first place as it does not wear away so soon as the bony part, it preserves the grinders longer for Mastication, and also that it is necessary the Teeth should have unequal surfaces, that for this purpose the Enamel is always disposed in Striæ or Lines on the Body of the Tooth, that they may wear unequally, of course be longer serviceable — A comparison or two will illustrate this Matter — The Surfaces of Mill stones are made rough, that the Corn may be ground on their inequalities; when by long use the Inequalities are rubbed off, the Stones are rendered useless untill they have their surfaces again made rough, or as we may sometimes see in Old Fir stairs which have been worn by the feet, if there are on their surfaces any knotts, these knots like the Enamel being of a harder Nature than the body of the stairs do not wear so fast, hence the surface is rendered unequal; it is just so with the Teeth — In the Teeth of Elephants the Enamel is disposed in Striæ thro the whole substance of the Tooth, but in those large Teeth which are dug up on the banks of the Ohio, the Enamel formed the cortical part as in the Human Teeth, which makes it highly probable that the Creatures they belong'd to were of

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the Carniverous kind, and if we may form a Judgement of them from their Teeth, they must have been greatly superior in bulk to the Elephant, hence it is likely that the Animal might have been a great Destroyer of the Human Race, and therefore might have been wholly extirpated by the Natives as the Wolves were in England. — As to the formation of the Teeth, the following things are to be observed in the Jaw of a little Child, there are Sockets for each of the young Teeth which are filled with a kind of Vascular pulp; the Basis and Enamel of the Tooth are first formed, afterwards the Fang shoots and lengthens so as to push on the body of the Tooth thro' the Gum, the Extremity of the Fang being the last formed; first the Basis is formed, then the body & and last of all the Fang — In a Child, the full Number of the first compleat Set is Twenty, which are all shed and succeeded by a second set. — The common Idea of the shedding of Teeth was, that the Germen of another Tooth lay originally in the Socket under the first, which Germen by encreasing into a Tooth pushed the first out, and supplied its place; but the rudiments of the second set are found ever surrounded by bone, and must work their way thro' bone before they can appear without the Gum. — It has been a question, whether the second set push the first out, or not; they are not pushed out, but fall by a very singular Process — The first set of Teeth have very long Fangs, and as the second set grows up, these Fangs moulder away, and the Teeth fall out at last without any Fangs at all. — Sometimes a Child is born with a Tooth or two without the Gum, but as they are little more than the body of the Tooth, they soon fall out, generally in a few Weeks, they have not the Apparatus for keeping them in. — The common Time of Children's cutting their Teeth is about the seventh or eight month. — A Child has its first set of Teeth compleat when it —

it is about two years, and an half, or three years Old, and these begin to drop about the 6th year — In the Elephant this process of Shedding the Teeth is much the same — It is not an obvious thing why we shed our Teeth, as we lose the first set very soon, and retain the second a great Length of time — When a Tooth has been drawn, or dropped from the Socket, it is always lost — One general Law of nature prevails here, that is if any thing is useless it is taken up and carried away — this is proved to be the case from the following Fact; if we examine the lower Jaw of a grown Person whose Teeth are firm, — we shall find that the hole where the nerve enters on the fore part is below the Middle of the Jaw, but in those that have lost their Teeth some-time before their Death, this hole is much above the Middle of the Jaw because the Sockets are carried away. By attending to this circumstance we shall be able to explain several Phanomena about the Face of Old People, for instance the short distance between their Nose and Chin, the Chin approaching the Nose which makes its projection greater; this the Vulgar call Nose and Chin — If we apply this doctrine to the soft parts of the Face there will appear to be too great a quantity of Lips, because they are now pressed into a smaller compass. If we look into the Mouth the Tongue appears too big, and in Fact it is so, because the cavity of the Mouth is made less — We come next to speak of some of the Diseases of the Teeth, — the most common is a Disease simply requiring the Teeth to be kept clean for its cure, — In young people the Juices are not so much disposed to foul them, but in Old people there is a disposition in them to form a Crust or Tartar on the Teeth, which is a tender, friable substance of a blackish colour, and of a spongey nature; from its spongy quality it collects

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the Juices that grow putrid, and often infects the Breath to a great degree, this may be remedied by Dentifrices, and brushing it off, rubbing the Teeth with a dry Cloth is a very ready Method of removing it when we can get at it. — Acids readily dissolve it but they always dissolve some of the Enamel, and substance of the Tooth also, which makes their frequent use hurtful. — Scaling the Teeth with a proper Instrument will take it off very well, and when judiciously managed, it is impossible it should do any harm. — Dr Hunter mentions some remarkable Instances of the prejudice this Tartar is of to the Teeth. — One in particular was the case of a young Man, who came from the Country with an Intention of having all his Teeth drawn on account of Ulcerated Gums, and Breath so fetid that no One could stay near him. The Teeth were quite black, and covered with Tartar, but by breaking a peice of the Tartareous Crust off, the Dr saw a fine white sound Tooth underneath, and he advised him to have them scaled, in a fortnight after, he returnd to the Dr with great Happiness, for his breath was perfectly sweet, and his Teeth one of the finest Sets ever seen. — Another Disease of the Teeth is when they become rotten, as if it were from some Animal eating them away, it has just the worm eaten appearance, but whether it really is so or not, is not certain. — Breaking the Tooth is not always the occasion of its becoming rotten, it must depend upon something else. — At first there is a little black spot on the surface which encreases and crumbles away into a cavity bigger and bigger. Nothing stops the decay

decay, it is therefore best to have the Tooth out soon, but in the end it becomes very troublesome and painfull with so short a Stump as to render the drawing exceedingly difficult and severe. Of late Years a method has been invented of transplanting Teeth out of one head into another; this appears to answer very well, particularly in those which have a single Fang, but whether they continue firm as long as the native Teeth is not yet deter-mined by a sufficient number of Years, it being but a lately introduced practice — Artificial Teeth too are very serviceable especially in the fore part of the mouth for Speech —

The Diseases of Bones

Lecture 26th.

In the first place of the softness of Bones. This is of two kinds, one proceeding from a want of bony Matter, which has already been explained, the other of a more extraordinary Nature; We shall just make some Reflections on the heads of Ricketty Children. The head of a Ricketty Child is different in figure, and size from a well perfected head, it is large, the Parietal bones are very prominent in the middle, and the upper part of the head flat, the Fontanel is open tho' the Child be considerably advanced in Life, the bones on the side of the head are thick and spongy. This is a Ricketty softness.

The second kind of softness is much more extraordinary, it sometimes happens to grown Persons, and without any evident cause. The Bones become softer and softer till at last they are unable to support the weight of the body, and are reduced to a kind of fleshy substance. This kind has never been accounted for; Doct^r Hunter calls it a softness from Idiopathy, that is from something in the Constitution, we are not acquainted with; M^r Gooch of Norwich has published a case of such a softness of this kind, that with a knife he easily divided the bone of the lower extremity longitu-dinally, beginning at the Toe, and carrying the Blade thro' the Metatarsal Bones, Tarsus, Tibia, Patella and Os Femoris.

A case of this kind of ~~s~~ softness was to be seen at Paris of a woman, whose Legs and Arms were twisted in all manner of directions. The Reason why the bones, after having been consoli-dated in their substance, do become soft is what we cannot

account

account for the wasting of Bones, the Anima or ruling Principle is possessed of a Power, by which it can take up Parts of bones by absorbent Vessels, and carry them out of the constitution, as we have already observed in the Lecture on the Jaw bone; but can the bones fall away or waste in bulk like the soft parts, which from being phlegmy and fleshy sometimes shrink up to nothing but skin almost? Mr Cheselden says they may, but the case which he has given does not prove it, for it is most probable the bones were never bigger. A case similar to Mr Cheseldens was communicated to Dr Hunter by Mr Toin late of St Thomas's Hospital. A Poor Woman that was almost starved to Death by hunger and cold in the streets was brought to the Hospital and died there, the bones of one Leg and Thigh were smaller than those of the other, and what seems strongly to contradict Mr Cheselden's Opinion of wasting being the cause is, that there was an Anchylosis of the Joint of the Hip, which probably had prevented the bones ever coming to their full Growth, by making the Limb motionless at its upper part; it does not appear that the bones ever waste after having been once firm, and yet remain sound. One of the most common Accidents or Diseases of Bones are Fractures. A Broken bone if kept still and the body be healthy unites and becomes firm by means of a Callus: a Callus was formerly supposed to be an inorganic concrete like Paris Plaister, and it was said that if a Callus was broken it would not throw out any Liquor to reconnect it, and therefore that a Callus was always thicker and stronger than any other part to prevent a possibility of its being broken. The Callus strictly speaking is bone, for it is organic, and has all

all the properties of a boney substance, it exhibits the same Phænomena as bones do when steeped in Acid, it is coloured by madder as Bones are, by injection we can fill its Vessels, and when broken it will furnish again and again — How is this Callus produced? Mr Du Hamel says, that the Original bone itself is made of Layers of Periosteum like the layers of wood from the bark of a Tree, as was said before in speaking of the formation of bones, that the bone is surrounded with these layers, and that when a bone is broken these are made ragged, inflame, thicken and fill up all the interstices and at last become bone thus uniting the fractured ends, but it appears plainly not to be so — Mr John Hunter broke the bones of Chickens, and opened them after One, two, or three days, and so on till many days had elapsed since the fracture was done; the results of these experiments the Dr says were as follows; after the first day there was a glary, ropy, bloody fluid in the cavity between the ends of the fractured bone; after two days it was gelatinous and free from Blood, and as more days elapsed it appeared firmer, and by and by the fluid was seen to be Vascular by injecting the bone, and the Vessels were seen coming from the sides of the bone and running from One end to the other. A Pupil of Hallers is of this Opinion he says that Callus is at first a glary, bloody fluid, next a Jelly next a Gristle, and that in the Gristle Ossification begins to shoot, the Gristle serving as a bed for the bone to shoot in, so that the ends of a broken bone pour forth a fluid, which undergoes the change just mentioned — When Bones are not well set, the cavity between the broken ends is large, but the whole cavity being filled with this fluid, the ends are as firmly united by

means

means of the Callus when far asunder as when very near together; - If the fractured ends should lacerate the neighbouring soft Parts so as to make cavities in them, the fluid will run into them, and the bone will be united by an irregular Mass especially in a part where no bandage can be applied, as in a Fracture of the Os Femoris near it's head - Those bones which are well set have less Callous than those which are badly set particularly where the Fracture was surrounded by Bandage - From hence we see how Anchylosis is formed & caused by a Fracture communicating with the cavity of the joint, the Callus flows into it, and forms irregular masses, which hinder motion, so that moderate bandage is of use to confine the Callus within bounds, and prevent it's flowing into the Laceration; when a Rib is broken, we apply a bandage to moderate its motion in Respiration, and the Action of the Lungs while the Callus is soft smoothes it, and keeps it within bounds but as there is nothing to keep it within bounds upwards and downwards the Callus oftentimes cements two Ribs together we should take care therefore to examine the Part before we perform the Operation Paracentesis, if there ever has been a fractured Rib - When the two bones of the Leg are broken they unite not only by their own proper ends, but the Callus flows from the Tibia to the Fibula, and vice versa when the laceration has opened a way for it; so that after a fracture of the two bones are often united together; if this happens between

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the Ulna and Radius, it will hinder pronation and supination. sometimes there is a peculiarity in the constitution, so that no Callus is formed, and the broken bones continue disunited. The only One Constitution that we know of which occasions this is a very high degree of Scurvy as was said to be the case in Anson's Voyage, and it has been said that a consolidated Callus will be dissolved again, and the ends of the bone disunited if any One be affected with a high degree of Scurvy afterwards, but it cannot be liable to any disorders, but such as the bones themselves are liable to, indeed from it's being more spongy it may perhaps be first attacked with this disease. When there is no scorbutic Affection this Want of Callus is owing to different circumstances not so clearly understood. It has been said that in this case the two ends have no disposition to throw out Callus, but they certainly have. In Du Verney's Posthumous Work mention is made of a Monk, whose Ulna and Radius were fractured and never united again. The Arm was examin'd a considerable length after when he was dead, and it was found that tho' the ends of the Ulna, nor the ends of the Radius were united, yet each end of the bone was united with the Cartilaginous end of the other in a transverse manner. Mr White of Manchester had a Case somewhat similar to this under his care, the ends of the fractured bone produc'd no Callus for sometime, he laid open the part and saw'd off a piece from each of the broken ends and then they united with Callus; he found it was occasion'd by a piece of skin lying between the two ends of the bone, and thus by performing the Office of a Valve, prevented the fluid from running

running out to form the Callus. If a Fracture of the Arm, Thigh or Leg should continue loose for six Weeks it will be best to throw off all bandage, and give the greatest Freedom to the circulation thro' the Limb, for by this means probably it may recover, and it is very likely that our bandage is often made too tight and is hurtfull. It is really wonderful what we daily Observe in simple fractures, tho' there is often great laceration and extravasation of blood internally yet if the skin is but whole, they generally heal very kindly; On the other hand if the fracture is a compound One, for instance if a Splinter of bone should peirce the skin, there is commonly great Inflammation, Fever &c in short there is no end to the mischief. Mr John Hunter accounts for this by supposing there are two kinds of Inflammation, a suppurative, and an Adhesive One and that in simple fractures the suppurative inflammation very seldom comes, but only the Adhesive. If this is the case we should always treat a Compound Fracture as much like a simple One as possible; and in slight cases we should not probe or dilate the Wound, but keep the Limb still and quiet. It seems very likely that exposure of the parts to Air conduces towards the Mischief. Mr Pott broke his Leg in mounting his Horse with his Boot on the bone peirced the skin, and it had the appearance of a very bad compound fracture, notwithstanding which it did well very soon, this he accounted for by supposing that at the time the bone peirced the skin, the flesh was twisted, so that when it return'd to its natural form it closed over the Orifice and excluded the Air. — Commonly the inferior part of the thigh bone when fractured is behind the upper part, when the

Fibula

The Diseases of Bones

Fibula only is broken, it is of no consequence, the Tibia keeps it from riding much, indeed it hardly wants binding up; when the Radius and Ulna are broken, sometimes the Callus shoots transversely, and then pronation and supination cannot be performed — The Tibia commonly breaks below it's middle that being it's weakest part, and the Fibula breaks oftenest a little below its upper Extremity where it is weakest, but it is of very little consequence in this Part — When the Patella is broken transversely, and the pieces much separated, the use of the limb is in a great measure lost, it is better to unite them if possible. Sometimes after the fracture of a Patella a Ligamentous substance adheres to the bones of the Joint coming to them, and prevents their motion. A Lady who had had her Patella broken, stumbled against a Carpet and found something gave way in the Joint, she supposed the Patella was again broken, but was agreeably surprized to find she had gaind the Use of her Knee, which ever since the fracture had been almost lost; this was occasion'd by the giving way of this Ligamentous substance form'd from the Patella and continued to the end of the Femur — A loose body is sometimes found to catch in the Joint of the Knee, and make it stiff with great pain, then it will slip away again, and the motion of the Joint be as compleat before — Dr Hunter thinks this is caused by the angles of the Bone in the Joints shooting out Excrescences, which breaking off occasion this complaint; the same thing may happen in any of the Joints; when we cant catch hold of this substance, we should cut it out at the upper part of the Capsular Ligament — We come next to

speak

speak of Exfoliation. We are to consider Bone as as a living part which has a disposition to throw off a Part of it that is become dead, and to renew it. We have said that the fracture of the inner table of the Skull commonly exceeds that of the outer table, and makes the Elevation of the depressed piece difficult or not to be accomplished with one opening only. Sometimes a suture is opened by Violence, frequently when a fracture crosses it, which must be considered as a fracture and treated as such, when there is a fracture near a suture the bone must be trepanned on both sides of it because of the dupli-cature of the Dura Mater to give vent to any matter or extravasated fluid, and if the violent Symptoms continue, we should perforate again and again. What has already been done must not make us neglect to discover if possible the very ends of the fracture. We must not trust to trepanning one part of it alone, but do it in many if the symptoms require further Relief. And we should always contrive to place the Trepan on the most depending part. If after scalping and Trepanning the Patient lives what follows? It is the nature of Bone to become dead to a certain extent, but its subs-tance remains unchanged while the edges of the living bone inflame, and endeavour to bring about Exfoliation by casting off all the fibres round round the dead Part, so that after trepanning the exfoliated piece of bone comes away like a Ring. This Process in the bones appears to be very similar to that by which the fleshy parts of the body are renewed

renewed; Tendons and other parts often slough in their whole extent, but in bones the dead parts always appear the same — Hot Irons and Caustics applied to the living bone will make it dead, and then Nature will bring inflammation and suppu-ration, by which means the dead parts are seperated from the living; Exfoliation is said to be of two kinds, sensible and insensible; when a peice is exfoliated large enough to be taken off, it is called sensible Exfoliation; after Exfoliation has taken place the edges of the living bone shoot out new fibres, which supply the place of the old entirely when the Exfoliation is not very large and the patient young; but in old Subjects where there is great Loss of bone, part of the cavity is afterwards only covered with a membrane; when a bone inflames to throw off a dead part it is altered in its appearance, it has a number of little Lumps like Papillæ on its surfaces, but the dead part remains unchanged — The Caries of a bone is not a superficial disease, it generally affects the part of the bone quite thro' from one side to the other; Sometimes the bone is affected most in the middle, and a peice is seperated from the rest and is loose within — Dr Hunter shewed a case where a carious peice of the Tibia was seperated internally, and remain'd loose in the bone — A Bone that becomes dead immediately has not its Texture altered, but in some cases the texture of the bone is soon altered thro' and thro', especially from

Fever

Fever, and remains alive till it crumbles away; so that partial Exfoliation can be of little service, and burning a carious piece of bone does good no farther than by deadening the piece and thus procuring a large Exfoliation in less time, but it cannot remove the disease. — A Woman subject to Fits in One of them fell into the fire, and lay there long enough to burn the Integuments of the Occipital, the bone was deadened to a great Length, the piece exfoliated, and was as large as an Ordinary Saucer. — She got well, and never had another Fit, the piece exfoliated was unaltered (the fire had not burnt, only deadned it) and of the usual Colour. —

Lect. 27th

The Abdominal Muscles

Lecture 27th

There are two methods of treating the muscles; the first is to shew a compleat set of them at one time, as those of the head, those serving for Respiration &c, the second is to shew them in their natural order as they are placed in the body; both these methods have their Advantages and Disadvantages, but we shall chiefly follow the last method, as we shall then see the parts in their most natural state. – The muscles of the Abdomen are five pair, the Obliqui Externi, the Obliqui interni, the Transversales, the Recti, and the Pyramidales; these together with the Integuments and Peritonaeum form the Parietes of the Abdomen. laterally they are fleshy, in the middle they form a broad Tendon or Aponeurosis, all below a line drawn across from from the Anterior point of the Spine of one Ilium to the other is Tendinous – All the way down from the Xiphoid Cartilage to the Pubis is a whiteness called Linea Alba, having the Navel on its middle part; the whiteness on the out side of each Rectus muscle is called Linea Semilunaris, and from the outer edge of the Rectus or Linea Semilunaris to the Linea Alba are several cross whitenesses called Linea Transversæ, commonly three on each side. The Obliqui Externi, so called from their Situation are very large muscles of different lengths in different parts of them, they cover part of the Chest itself, they are attached to the seven inferior Ribs by slips or digitations between those of the Latissimus Dorsi and Serratus major anticus. The being very nice about this Attachment is of little use –

use, because there is variety in different subjects, their fibres run downwards and forwards to the spine of the Ilium, and the Tendinous fibres run on thro' the Groin to the Pubis; they act as straight muscles by drawing the Chest towards the Pelvis, or the Pelvis towards the Chest, when one acts alone, it twists the body to one side & they act also as Respiratory muscles by drawing the Ribs downwards, they act likewise as hollow muscles by flattening the belly, and compressing the Viscera, they help to expel the Urine and Fæces at the same time they press the Viscera against the Diaphragm and so act on the Lungs

Poupart's Ligament is formed by the Aponeurosis of the abdominal muscles being stretched on the hollow of the Groin between the anterior edge of the spine of the Ilium, and the Os Pubis. under this Ligament the Intestine passes out of the abdomen, in a Femoral Hernia. The Testicle is suspended by the Spermatic Cord, that passes thro' the Tendon of the External Oblique muscle down to the scrotum close by the lateral edge of the superior projecting part of the Os Pubis The Passage in the Tendon is called the Ring to which it is every where attached; The Slit in the Tendon would be very large were it not for Cross bands uniting the fibres together. The Obliquus Internus runs downwards and backwards and is exactly of the size of the Abdominal space without bone, for it is attached to the spine of the Os Ilium, and to the last Rib and margin of the Chest, and by uniting with the common Aponeurosis it is inserted into the Linea Alba, at its posterior

part

part it is very short from the spine of the Ilium to the margin of the Thorax; its action is either as a streight or hollow muscle. The Spermatic Chord does not pass thro' this muscle, as some authors assert but immediately under its lowermost fibres, as it does also under the Fibres of the next Muscle the Transversalis, The Tendon of the Obliquus internus as it runs towards the Linea Alba splits into two Lamina, one of these is blended with the Tendon of the External Obliquus, and passes before the Rectus into the Linea Alba, the other Lamina enters the Linea alba by passing behind the Rectus, and is blended with the Tendon of the Transversalis, which passes entirely behind the Rectus, so that the Rectus is inclosed in a Tendinous Sheath, and to this Sheath it is loosely united by Threads of Cellular membrane, which are easily torn thro' with the fingers, but at the fore part of this muscle the Union is much stronger between it and the Sheath and cannot there be seperated as elsewhere, The Transversalis arises from the margin of the Chest a little on its inside and forms the Fascia of the Loins, it is attached to the spine of the Ilium below, and forms a Tendon which gets to the Linea Alba by means of the common Aponeurosis, The Action of this muscle is to gird the Abdomen and depress the Ribs for Expulsion of the Faeces &c. The Rectus is divided by the Linea Transversalis into many portions of flesh with identations between them. It is narrower below where it is attached to the lower side of the Os Pubis than it is above where it is attached to the upper and fore part of the margin of the Chest on the side of the Xiphoid Cartilage

The Abdominal Muscles

Cartilage — It acts as a hollow and straight muscle — The different fleshy bodies of the Rectus appear to be thus formed, to draw the abdominal Muscles up or down so as by their Action to compress some particular part of the Abdominal Contents, and shift them a little; these seem probable from the indentations being firmly united to the Anterior part of the sheath — Dr Nicholl's opinion concerning the Use of the Recti was that they together with the Pyramidales draw down the Navel so as to relax the Ligament coming from thence to the bladder, and thereby enable us to expel our Urine — The Pyramidales are sometimes wanting, and therefore their Office is not so material but that it may be supplied by some other Muscle, or by the Abdominal Muscles in general — These five pair of Muscles have on their inside the Peritonæum, which is very smooth towards the Abdomen and connected with the Muscles by Cellular Membrane — This Membrane is reflected over the whole Abdominal Contents and forms their external covering; so that water in an Ascites touches nothing but this Membrane, and cannot get out of the cavity of the Abdomen — The Abdominal Contents then may be said to lie behind it, and so do the great Blood Vessels & Spermatic Vessels

Lect. 28th

The Male Organs of Generation

Lecture 28th

We shall consider them in the Order of the secretion of the semen and its Expulsion, and as they appear in the Adult — The Testicles take their Vessels from the great Vessels as high up as the Loins the Vena Cava lying on the left side of the Aorta — The Aorta sends off two little Arteries from its forepart, one on each side, a little below the Emulgents called Spermatic, that of the right side comes from the fore part of the Cava, and turns with the right spermatic Artery; the left spermatic Vein comes from the left Emulgent Vein, and goes down with the left spermatic Artery; On each side the Artery and Vein tend towards the Groin, not in a direct course, but a little about to avoid being hurt by the Motion of the Intestines; they are connected to the fixed parts by the Cellular membrane and lie behind the Peritonaeum — There is great Variety in the manner in which they arise from the large Vessells, now and then from the Trunks, and now and then from the Emulgents, that in general as before described — It has been said, that the spermatic Artery is smallest at its Origin, but this is a mistake — Eustachius says that there are communicating Canals between the spermatic Artery and Vein, but injections prove this to be an Error — Students from not reflecting that these Vessels pass behind the Peritonaeum are apt to imagine, that there must be a hole in the Peritonaeum to let them pass thro', but they are no ways concerned with each other, they pass under the Peritonaeum thro' the Ring in the external Oblique Muscle into the Groin following nearly the sweep of the Pelvis Rim,

that is

The Male Organs of Generation

that is, they run downwards and inwards; just as they peirce the Tendon of the external oblique Muscle they join the Vas Deferens. (The Intestines are contained in the cavity of the Abdomen, and therefore whenever a bowel is push'd thro' the Ring forming ~~the~~ Rupture, either the Peritonæum must be stretched out before the Bowel, which is most commonly the case, and then that part of it is called the Hernial Sac, or it must be torn to let the bowel pass — Where the great Artery and Vein pass under Poupart's Ligament to go to the Thigh, the Epigastric Artery arises from the former, and goes upwards to the Rectus Muscle. The Intestines in a Femoral Rupture are sometimes on the other or perhaps on both generally how-ever they are on that side of it near the Pubis. Underneath the Tendon the spermatic Vessels have other parts united with them, and then the whole takes the name of Spermatic Chord. The Chord consists of Artery, Vein, Vas Deferens and Cremaster Muscles with nervous filaments, and Lymphatic Vessels, and passes close by the projecting part of the Os Pubis just over the Interior end of Poupart's Ligament. The Cremaster Muscle is made of some of the fibres of the obliquus Internus that come from the Spine of the Ilium, it wraps itself all round the Chord, and goes with it thro' the Ring to the Testicles, it suspends the Testicle in the Scrotum, and spreads its fibres over the body of this Gland, by its action it draws the Testicle upwards towards the Pubis besides this the Chord has a thin Tendinous Fascia from the outer part of the Tendon of the external oblique Muscle

old

The Male Organs of Generation

Old Authors say, there is a Sheath proper to the Chord & Testicles call'd by them Tunica Vaginalis Communis, but the Spermatic Chord has no vaginal Coats, it is connected with the Scrotum by Cellular Membrane Only, to the Testicle however there belongs a bag or coat call'd Tunica Vaginalis propria, which while it is unopened makes the Testicle appear one even oblong mass. This bag is loose from the Testicles every where, except a little longitudinal part behind, where it is connected with it in its whole Length; In this Bag the water of an Hydrocele is lodged, and obscures the Testicle except at its back part, where it may be felt with the finger, every where else the Testicle is cover'd with water, and cannot be felt. If we open the Bag the Testicle appears to be composed of a body, and the Epididymis loosely connected with the body. The Tunica Vaginalis is originally Peritonaeum as will be shewn when we come to the Fœtal Testicle; it is reflected over the Testicle and forms it's outer coat call'd Tunica Albuginea so that the water of an Hydrocele can touch nothing but this Membrane. The Testicle is an oblong body one end laid upwards and ~~forwards~~ forwards, the other downwards and backwards; the Spermatic Chord enters it at its posterior side, that where it is connected with the Tunica Vaginalis behind, the Vessels at the upper end, and the Vas Deferens at the lower; the Epididymis is upon the back part of the Testicle, and outside of the Vessels, it begins with a knob at the upper end and runs to the lower end, and makes another knob there; by Observing

these

The Male Organs of Generation

these circumstances we can tell the Right from the left, the lower end of the Epididymis turns in and then runs up to form the Vas Deferens which runs up on the Inside of the Vessels, the Artery and Vein in the Chord branch, and go principally to the Testicle, some of the branches go to the Integuments. Those branches which go to the Testicle run in a very Serpentine Manner call'd Vasa Pampiniformia; the Vein being large are apt to become varicose. these vary from a troublesome and oftentimes a painful disease call'd Varicocele, frequently appearing and disappearing suddenly, it gives an odd uneasy pain sitting or standing, which is much abated by supporting the Testicle It may not uncommonly be caused by a too great tightness of the Waistband of the Breeches. Now for the structure of the Testicle and Epididymis. The Testicle is immediately inclosed in a strong Tendinous Coat call'd Tunica Albuginea, united with it, but a small force will separate them; to the great strength and firmness of this membrane the great pain of the bruised Testicle is owing, as it hinders the swelling and injured parts are more or less painfull in proportion as they are distended with more or less difficulty; the pain of this part is very similar to that of the stomach when it is bruised, it is a Dull oppressive pain and entirely unmanns us. The substance of the Testicle is all Vascular. The spermatic Artery shoots from behind to the forepart principally, but some branches proceed round it. Writers speak of a Tubular substance appearing from a transverse section, the tubes proceeding from a Center to the Circumference in several portions like as in Orange or

Lemon

Semen, but this seems to have no foundation; Besides Arteries, Veins, Lymphatic Vessels, and nerves, there is in the substance of the curling threads or tubuli which are long and twisted up in a wonderfull manner; these are the secretory Vessels that carry the Semen, We cannot trace them into the Vas Deferens, but the Vas Deferens may be traced into these Tubes. The Vas Deferens is very thick externally without the Abdomen, and may be easily distinguished in the Chord with the finger. If Quicksilver is poured into it, it goes down to the lower end of the Testicle, and shews that the Epididymis is made of this Tube twisted into a surprizing number of Convolutions, and at last dividing into a number of Tubes it enters the body of the Testicle at the upper end, and is there lost; by proceeding in this manner the tubuli Testis may be injected; The two ends of the Epididymis are closely fixed to the body of the Testicle above and below, but its middle part is loosely fixed. The present Professor Monro has observed, that there sometimes is a Tube which runs up from the Epididymis into the substance of the Chord, and this he supposes to be an absorbing Vessel, that takes up the Semen from the Testicle and conveys it into the Blood vessels when not draughted off by coition. Dr. Hunter has seen it more than once, but he thinks that it is a Lusus Naturæ, for in one case he found it running up to the Chord, and coming down to the Epididymis again, and he never could trace it out any communication between this Tube and the Vessels; and in another case of this kind he injected the Tube with mercury and found it to have an Impervious end, a blind Tube.

We

The Male Organs of Generation

we shall now make a few Reflections on Ruptures in Adults — the most common of them is the Bubonocele, when the Intestine comes thro' the Ring into the Groin, and by degrees descends into the Scrotum in coming down it carries along with it the Peritonæum so as to be contained in a Bag called the Hernial Sac — this Hernial Sac is directed towards the Testicle within the middle of the Chord, and has the Cremaster Muscle stretched over it, it forces its way thro the Cellular Membrane of the Chord, being directed down it by the Cremaster Muscle forming as it were a Sheath round it, but connected with it. —

From what has been said it appears, that in Adults the Intestine can never get down to the body of the Testicle because of it's — reflected Membrane the Tunica Vaginalis, neither can the water of an Hydrocele ever get into the Chord, so that there may be an Hernia in the Chord, and water in the Tunica Vaginalis existing on the same side without any communication with each other, but we shall find that in Ruptures which happen to Children the case is different, the Intestine being often found in Contact with the Testicle —

Lect. 29th

The Male Organs of Generation

Lecture 29th

We will next take a View of the Testicle as it is in the Fœtus In the Fœtus the Testicle is placed in the Abdomen on the fore-part of the Psoas Muscle covered with the Peritonæum – The Vas Deferens does not run with the Artery and Vein, but goes downwards & backwards, it has a pyramidal body having to its lower end called Gubernaculum, as large as itself, so called because it seems to guide the Testicle into the scrotum; when got down into the Scrotum, a probe may be passed thro' an Aperture from the Abdomen down to the body of the Testicle thro' a sheath which is afterwards obliterated except at the lower part where it always makes a bag for containing the Testicle call'd Tunica Vaginalis, so that the Tunica Vaginalis is plainly an elongation of the Peritonæum – This sheath is a long cavity contracted like the end of a bottle at its upper part, and dilated to contain the Testicle at its lower, it is afterwards every where obliterated except what is immediately upon the Testicle and a very little way up the Chord. Haller was the first who described the descent of the Testicle from the Abdomen into the Groin, by which Dr Hunter easily accounted for the Congenial Hernia hinted to him by Mr Sharp about the year 1748 – The Gubernaculum and Testicle generally descend to the scrotum about a Month or two before birth – In their Descent they drag the Peritonæum thro' the Ring, and it then forms a bag communicating with the cavity of the Abdomen; the Peritonæum that originally cover'd the Testicle makes the Tunica Albuginea, and if the Intestine should descend

into –

into the bag it will touch the Albuginea, so that the Hernial body will be in contact with the Testicle; in an adult the Hydrocele and Hernia may be distinct from each other, but in a Fœtus, they cannot because of the Tunica Vaginalis opening into the Abdomen. —

The Penis is made up of spongy substance incased with a Tendinous sheath, which when the Penis is flaccid the blood is thrown out of the spongy substance, and then becomes soft, this spongy body is double One on each side call'd Corpus Cavernosum, underneath these and between the two there is another spongy body call'd Corpus Spongiosum Urethræ, having the Urethra running thro' it. The two Corpora Cavernosa seperate under the Pubis, & are fixed to the inside of the bone, one on each making the Crura Penis. The Corpus spongiosum Urethræ goes down to the Perineum & makes the bulb of the Urethra The Corpora Cavernosa terminate forwards each in a point, here they are covered with the Glans, which is formed of the Corpus spongiosum Urethræ continued over them. We shall now consider the parts concerned in the Operation of Lithotomy. Before the Symphysis of the Pubis is the Urethra, and a little lower is the bulb of the Urethra lying in the Perineum. The Anus has a Circular Muscle call'd Sphincter Ani by which it is constringed and kept close; on each side of the Anus is a broad thin plane of muscular fibres call'd the Levatores Ani, whose office is to raise the Anus, & assist in going to stool. The Muscles of the Penis are the Erectores Penis, which arise near the Tuberosity of the Ischium, & run forward & upward into the Penis, but how they erect the Penis is not clear; The Accelatores Urinæ come down obliquely & backwards from the Crus Penis on each side

side and cover the bulb of the Urethra, making where they meet a middle white Tendinous line along the bulb; they are said to act by jerks to throw out the last Drop of Urine. The Perinaeum has one Muscle call'd the Transversalis Perinaei. The cavity of the Urethra is larger when the Penis is relaxed than when it is erected, which accounts for the difficulty with which we make water when the Penis is erected. It is difficult to say where the bulb begins or ends, it is only a part of the Urethra made larger than the rest. In Coitu the Acceleratores throw the semen out of the Urethra by compressing it & making smaller, & increase the quantity of blood in the Corpus spongiosum so as by this means to lessen the Canal also, the Canal being fill'd with semen to be expelled by the Action of this pair of Muscles. The Transversalis Perinaei arises from the inside of the Tuberosity of the Ischium on each side & goes into the Perinaeum. To introduce a staff it is much better to keep the concave part to the patient's body from the beginning, & when the end has got into the Perinaeum raise it a little & it will go into the Bladder. The Old Surgeons introduced the staff by keeping the convex part to the patient's body till the point got to the inner part of the Symphysis of the Pubis, then turning it they carried it into the Bladder. In the Old way of cutting for the stone the parts were made to project by the staff nearly in the middle of the Perinaeum, but commonly a little to the left side, the incision was made upon the bulb of the Urethra. The parts cut thro' were the Integuments, the left Accelerator Urinae and the Transversalis Perinaei, the spongy part of the

Urethra

Urethra and Bulb, all the passage between the bulb & bladder was stretched or Torn to make way for the Instrument – Mr Cheselden introduced the new, or lateral method into general practice He said that the Canal of the Urethra was too small to admit the necessary instruments, he conceived therefore that cutting the Canal on the bladder would be attended with less inconvenience and danger than the stretching or tearing it – To this the favourers of the old method of Lithotomy answered, that the passage could not be safely cut into any farther than the bulb because of the Rectum being in the way – But Mr Cheselden said that if the parts were turned considerably to one side (the left commonly) so that the staff should come near the Ischium, an incision might be made parallel to the bone down the Groove of the staff in the bulb, and that by plunging the point of the knife into the Groove of the staff in the bladder, turning the edge of the knife upward, an incision might be carried thro the Prostrate Gland & membranous part of the Urethra from the bladder to the Bulb. The method most commonly used is the lateral. The Surgeon in this cuts the left Accellerator Urina part of the Transversalis Perinaei, a little of the Levator Ani & the bulb of the Urethra; this is all that is done by the Knife & is not as Mr Cheselden says – The Corpora Cavernosa Penis, as we said before are two strong Tendinous substances, on their outside laid close together for the greatest part, but behind are divided to make the Crura Penis, between them & the upper side there is a groove call'd Vena magna, call'd Vena spinis Penis and Vena

Dorsi —

The Male Organs of Generation

Dorsi Penis, below there is another groove between them for the Corpus spongiosum Urethræ ~ The middle partition between the two Corpora Cavernosa is call'd the Pecten, for two thirds of it's length nearest the Glans it is perforated into Interstices like a Comb, thro' which there is a communication between the Corpora Cavernosa, and by injecting the one, we inject the other also, but the other third part is a firm Septum without any Interstices or Perforations; thro' the Center of each Corpus Cavernosum runs an Artery, & the blood carried by them is taken up and returned by the Vein in the groove on the back of the Penis, the coat of the corpus Spongiosum Urethræ is very thin ~ That a continuation of the Corpus Spongiosum Urethræ makes the Glans is very plainly seen because by injecting that we also fill the Glands, which is not the case if we inject the Corpora Cavernosa; The Cells of these spongy parts dont seem to be similar to the Cells in bone and other parts to communicate with each other, but appear to be made up of plexuses of Veins. The Vessels of the Penis are an Artery running thro' each Corpus Cavernosum, on the upper part or back of the Penis a Vein called Vena magna & makes all the veins of the Penis, on the outside of each Artery is a nerve dispersing itself every where, towards the forepart of the Penis there are Chords going across thro' the Corpora Cavernosa to prevent as it were too much distension & enlargement in erection ~ these were first taken notice of by Morgagni ~

The Integuments of the Penis are the same as of the other parts of the body ~ In the first place it has Cellular membrane, which is here very tough, so as to have been called by some a Tendinous Sheath;

Sheath; where the Penis is connected to the forepart of the Symphy-
-ysis of the os Pubis the Cellular Membrane is particularly strong
and has been called Ligamentum Suspensorium Penis, but it can
hardly be called a Ligament, it seems to be only a common Memb-
-ranous connection – The Cuticle, Skin, & Rete Mucosum are very
thin on the Penis & never have any fat under them even in the
fattest bodies – The Prepuce incloses the Glands & is nothing more
than a fold of the skin, & the skin reflected over the Glans makes
its Coat, so that the Glans is covered three times over with the Skin
and it has the Rete Mucosum too, tho' that does not appear
because of its thinness as in the Lips; The Prepuce makes a
tight band underneath call'd Franum, which is fixed to the
underside of the Glans, & draws the Glans down in Erection,
The Franum is sometimes too tight naturally, and may
therefore be cut through, or by repeated coitions it is gradually
broke thro', and becomes loose; round the Basis of the Glans
there are said to be a number of little Glands, which secrete that
mucus or fluid that is of a fishy smell, after it has been retained
sometime under the Prepuce, – there is a little hole on each side
that appears by the help of a Magnifying to be source of this
fluid – Here it may not be improper to recommend clean-
-liness of all kinds, for it is very probable that many cutaneous
Diseases are owing to Nastiness obstructing the pores of the
skin; tho' we cannot see any nastiness on the skin with the
naked Eye yet by examining with a Magnifier we can plainly
see

The Male Organs of Generation

see it very foul - Frequent washing and warm bathing should be advised,, especially in Diseases of the Skin - The Greeks used much bathing both warm and cold and we do not that cutaneous diseases were so frequent among them as amongst us - A Lady consulted Dr Hunter for a general itching all over the skin; he judged it to arise from an internal uncleanness of the skin and directed the warm bath, in twice using of the remedy she was perfectly freed of her complaint - Whenever there is a general itching it is Ten to One but it proceeds from the before-mentioned cause, and if the warm bath be made use of it will as certainly be cured - The two proper Diseases of the Prepuce are the Phymosis, and Paraphymosis. The Phymosis is a common complaint of a young Child, and very often continues naturally thro' Life - It is occasioned by the ring of the Skin being too small to suffer the Glans to be uncovered and is very painfull when inflamed, often however it continues without any Inconvenience - When it becomes troublesome and painfull it is cured by slitting up the prepuce longitudinally and setting it at liberty, so that the Glans may be uncovered - the Paraphymosis is a girding of the Prepuce behind the Glans when that is uncovered, so that it cannot be returned back again over the Glans - They who have a tight foreskin are often liable to have a Paraphymosis when the prepuce is drawn

off the

The Male Organs of Generation

off the Glans, and by binding round the neck of the Glans it occasions Inflammation, and Distension so as to prove dangerous, if not relieved by making an incision through the tight Prepuce, and setting it free; a narrowing of the Prepuce is the occasion of both these diseases, and both are cured by a Longitudinal Incision.—

Lect: 30th

The General Contents of the Pelvis

Lecture 30th

Having now considered the external parts of the Male Organs of Generation, we shall take a View of the general contents of the Pelvis. The Terms, above and below, have been used in three different senses when applied to the Pelvis, which has occasioned much confusion; when we speak of the parts contained in the Pelvis, we shall always refer them to the Axis of the Pelvis, by which we mean a line supposed to be drawn from the End of the Os Coccigis upwards and forwards midway between the Symphysis of the Pubis and Sacrum. The Parics of the Anterior Half of the Pelvis is nowhere bony except the Os Pubis; the sides are bony at the upper, but not at the lower part; the Sacrum and the Os Coccigis make the Parics of the Posterior half; the lower part of the Anterior half from the Os Coccigis to the Os Pubis is made of the Levator Ani, the Sphincter Ani, & more forwards by the Transversalis Perinæi. The Situation of the Anus in general is at some little distance from the outside of the Os Coccigis between the Angle made by the Ossis below & the under part of the Os Pubis at its Symphyses, and before it are placed the Penis, the Transversalis Perinæi, Levator & Sphincter Ani, the Accelératores Urinæ, Erectores Penis, and Bulb of the Urethra over the fleshy brim of the Pelvis made by the Psoas muscli; on the left side passes down the Sigmoid flexion of the Colon with a little of the mesentery connected with it to form the Rectum. The Rectum in the human body is not straight as its name implies but is

so in

so in the Quadruped, it lies in the hollow of the Sacrum, & inside of the Os Coccigis & terminates at the Anus — It is every where supported by bone or Muscles, & lies so close to the bone, that to introduce the finger per Anum it must follow the course of the Os Coccigis & not be push'd directly upwards, but obliquely backwards, it follows the turn of the Sacrum and Os Coccigis making one or two side flexions, and is larger than the Colon to be a Reservoir for a quantity of fæces, which are retained by the Action of the Sphincter, till we evacuate them; this contrivance prevents us from the necessity of continually going to Stool; when the Rectum is full of fæces it presses on & greatly alters the Situation of the Viscera which are near it, & when it's muscular Action is weakened or destroyed as is sometimes the case, particularly in Women & old People, hard fæces are often accumulated & must be broke in peices before they can be ejected — The upper anterior part of the bladder is connected loosely to the Symphysis of the Pubes by Cellular membrane, its shape is oblong, it's lower anterior part is joined to the Prostrate Gland & is always in the same situation, but at it's back part it is continually varying in size from the different quantity of urine it contains at different times; when there is little or no Urine in the Bladder it contracts itself to almost a solid body, & when much distended with Urine, it then rises considerably above the Pubes — Dr. Hunter once saw it so much distended by suppression of Urine that it rose as high up as midway between the navel & Scrobiculus Cordis — Patients have been cut for the stone by making an incision above the Pubes into the Bladder, this is called the High Operation —

It can —

The General Contents of the Pelvis

It can only be perform'd without hurting the Peritonæum, when the Bladder is distended & rises with the Peritonæum a considerable space above the Os Pubis, for when it is not distended, it is situated below the Os Pubis, and an Incision made then will wound the Peritonæum twice before it gets into the bladder — The Prostate Gland possesses the whole space between the Bladder & the Rectum lying very closely on the latter, it may be distinctly felt in Ano, if it be pass'd beyond the Sphincter, it feels like a hard rounded body — That part of the prostrate Gland what is connected with the bladder is called it's Basis, & the opposite side it's apex — The Vesiculæ Seminales are situated immediately under the bladder beyond the prostrate Gland. The Ureter passes down from the kidney over the fleshy Brim of the Pelvis under the Peritonæum to the under side of the bladder, terminating in its most depending part with respect to the cavity of the pelvis. The Vasa Deferentia separate from the spermatic Vessels & pass down the sides of the Pelvis & Bladder within side of the Ureters to the Vesiculæ seminales — The Urethra begins at the lowest part of the bladder, so that every drop of Urine may run out, & hence we see the reason why a Man afflicted with stone shall all of a sudden have the Urine stop in making water, because the stone by its gravity falls on the beginning of the Urethra & stops the passage, & why he urines better in an horizontal posture, because the stone than gravitates to another part of the bladder; it passes into the upper side of the Prostrate Gland nearly at the middle of the Basis, & comes out at its under side a little below the Apex, so as to run almost thro' the upper flat side of this oblong body — The bulbous part of the Urethra is without the muscles of the Anus towards the Perinæum — The

Canal

The Male Organs of Generation

Canal that lies between this & the Prostrate Gland is the membranous part of the Urethra — The bulbous part is an enlargement of the Canal, & the membranous part does not enter it plump at its middle and so go thro' it, but enters it at its upper side all the way thro', so that it hangs pendulous from the Urethra — All the membranous part is within the muscles of the Anus, & lies close to the Rectum. By introducing a finger into the Rectum beyond the muscles of the anus, the groove of a staff may be distinctly felt in the membranous part, — The difficulty that sometimes happens in introducing the staff is occasioned by the end of the Instrument getting into a cavity of the Prostrate Gland — To remedy this, withdraw the instrument a little, then raise the end by depressing the hand, and it will readily pass into the bladder, if still any difficulty should remain, & it sticks, introduce the finger in Ano, then withdraw the staff a little, & draw the parts with the finger in Ano towards the Perinæum which will make the rest of the Canal straight, then raise the end a little, & it goes into the bladder — Authors are very inaccurate in their descriptions of these parts — Le Dran in considering the merits of the different ways of cutting for the stone made a drawing of these parts, which being judged by Heister to be their real situation is adopted by him in his book of Surgery — The parts are there drawn at a Distance from the Rectum, so that a knife might pass safely between it, & the bladder for some way up the prostrate Gland is not drawn in its proper situation, but lies at a considerable distance from the Rectum, & the Urethra is made to enter at the middle of the Basis & runs thro' it; These are evident Blunders

The Male Organs of Generation

Blunders, for the Bladder & prostrate Gland, & all the parts that are in a line with the Rectum are closely adhering to it, & there is no space between them — The Peritonæum goes down lining the inside of the cavity of the lower part of the Abdomen, & there covers the upper part of the bladder & Rectum, but a very little indeed of the bladder — All the Parts below the Peritonæum in the cavity of the Pelvis lie in the Cellular membrane — In the old method of Lithotomy the parts were all made to project nearly in the middle of the Perinæum and the incision could not be carried farther than the bulb of the Urethra, because the Rectum lay in the way, & must be wounded if the knife were carried farther towards the bladder, the membranous part therefore and Prostrate Gland were dilated or torn to make way for the extraction of the stone — To avoid the ill consequences of tearing or stretching so principal a part as the Urethra & Prostrate Gland Mr Cheselden made use of the lateral method, & describes his manner of doing it in this way — First introduce the staff & press it to the left side of the Perinæum so as to carry the Urethra & Prostrate Gland towards the Tuberosity of the Ischium; & to keep the Rectum clear he orders a finger to be introduced in Ano, & the gut to be drawn to the right side, then the incision to be made down to the staff in the bulbous part of the Urethra by cutting from the side of the Tuberosity of the Ischium towards the Perinæum, & by placing the back of the knife in the groove to carry the Incision on thro' the membranous part & prostrate Gland into the bladder. The Prostrate Gland lies so deep in the Body, & so close to the Rectum, that there is hardly a Possibility of cutting through it without wounding the

Rectum

The Male Organs of Generation

Rectum, and the prostate and membranous part lie so closely connected to the Rectum that they cannot be pressed aside from it, but if they are pressed to one side the Rectum will follow; It has happened to many Surgeons who have cut directly into the bladder with the knife, that the Rectum has been wounded, & the parts lie so near it, that this Accident cannot be avoided if we follow Mr Cheseldens Advice. We cant with safety then cut farther than the bulbous part of the Urethra, if we make use of the knife only; And many People cut in Mr Cheseldens Way were rendered impotent by the division of the seminal Ducts.

Lect. 31st

The Male Organs of Generation Continued

Lecture 31st

Having now considered the situation of the general contents of the Pelvis, we shall return to the male Organs — The Scrotum may be considered as an Elongation of the Skin & Cellular Membrane of the Penis, for by inflating the one we inflate the other also, It is ready formed in a Fœtus for the Reception of the Testicles, at what time the Testicles come down we dont certainly know, but from observing that in general a Child born at seven Months has them not down & that a Child born at eight Months has, we conclude that for the most part they come down one or two Months before birth — It has been supposed that the Efforts of breathing in the Child's attempting to cry protruded the Testicles in the manner of a Rupture or Inguinal Hernia, but this is hardly the case & it is done by an Internal process that we are not acquainted with; As to Structure the Scrotum is made of Cellular Membrane Authors have described a Muscle belonging to the scrotum by the name of Dartos, but without any reason there being nothing like Muscular fibre to be seen, the use of it was said to be to corrugate the scrotum, along the scrotum from the Penis backwards is a middle line call'd the Raphe — Many have describ'd the Septum Scroti, & said that it is a hard Ligamentous partition dividing the scrotum into two sides & cutting off all communication between them But it is only a firmer Cellular Membrane with Vessels running upon it from the Penis, making such a Partition as that there is a passage thro' from one side to the other — This has been the Subject of much Dispute — It is the Cellular Membrane more

Ligamentous

The Male Organs of Generation &c

Ligamentous & firm, but so as air will pass thro' it, & serves as a Suspensory Ligament to the scrotum to support the Testicles with the internal Male Organs we must take the Urinary Bladder, especially as it is intimately connected with them — In Morgagni's Time the Bladder was figured as it is in Quadrupeds, particularly as it is in a Dog, of a Pyriform Shape with a broad part — called the Fundus, & the bladder contracting gradually smaller & smaller into a narrow part call'd the Cervix which ran insensibly into the Urethra, but it is not so in the human body, its Meatus to which the Prostrate Gland is connected, is in the middle of the largest part & is there called Cervix its Fundus being the smallest part,, in both however the most depending part is the most capacious; Some have reckoned that part of the bladder connected with the prostrate Gland to be the neck & call'd it Cervix Vesicæ, others have consider'd all that broad part where the Urethra comes out from as the Cervix, so that it is difficult to understand what is meant by the Term Cervix Vesicæ,, In a Fœtus it is most commonly shaped as in a Quadruped, but as we get more and more into the perpen-dicular Attitude, the weight of the Urine makes the lowest part more capacious, & the Fundus then becomes smaller — Before we speak of the Structure of the bladder we shall take a View of the situation of the Vesicula Seminales, & Vasa Deferentia — The Vesicula Seminales lie underneath the bladder almost united together at the Basis of the Prostrate, & running backwards

& from

and from each other outwards to the sides of the Rectum — The Vasa Deferentia are two very small Tubes till they come under the bladder, where they are enlarged & with a duct from each Vesiculæ Seminales they enter the Prostrate, & open into the Urethra by two small Orifices on each side of the Caput Gallinaginis — The Peritonæum covers only the upper part of the bladder, & therefore cannott be reckoned a Coat, under this, & round the Bladder in general is the Cellular membrane; at the upper part of the bladder there is a point call'd Urachus, from which a pipe goes in the Quadruped Fœtus to convey the Urine into the Alantoeis & the outer coat of the bladder is muscular, composed of two layers of fibres — the outer layer arises all round from the Prostrate, & thence the fibres spread longitudinally over the whole Bladder upwards, under this is a layer of circular fibres running round the bladder, on the inside of this muscular coat the longitudinal & circular fibres are so mixed as to make a network in all directions — The Use of the muscular coat is to contract the bladder, & expel the Urine, which is accelerated by the action of the Abdominal muscles & Diaphragm, in straining to answer this purpose, & that the compression may be made equally every where, the fibres are disposed in all directions — In an obstruction of the Urethra where the Bladder is often much distended with Urine, the muscular coat does more than its duty and becomes stronger; from much action the whole substance is thicker considerably; this has been generally look'd on as a Disease of the

The Male Organs of Generation &c

of the bladder, & called Scirrhous — But Mr John Hunter says it is only improved in its muscular coat & therefore is thicker, some-times twice or thrice as thick as it is naturally; whenever we see a bladder of this kind we may almost be sure of the Urethra having being diseased; In People who are often making water and that too with great difficulty there is now and then a protusion of the Internal Coat thro' the muscular one by some of the fibres separating from one another & yeilding to pressure made on the Urine by the contraction of the bladder & pouches are formed, as was the case of Mr Gardiner, who had several of them at that part of the bladder which lies upon the Rectum, the internal coat was forced thro' the muscular into the Cellular membrane; the pouches contained stones & opened by a very small Orifice into the bladder — The first general Coat then is the muscular one, the next general one is the interior membrane of the Bladder. Authors speak of a Tunica nervosa between the outer & inner coat, but there is no such coat, it is only a common membrane connecting the two together — The bladder like other membranous — parts may slough — A Woman, who had suffered greatly from a Retention of Urine during a Labour, had a considerable portion of the bladder sphacelated, & sloughed away thro' the Urethra — Dr Hunter ordered her to take large quantities of bark, & contrary to his expectation she lived for some time & went into the Country after which he heard no more of her, but he supposes that the Urine must have gradually found its way into the Cellular membrane of the Pelvis & occasioned her death in length of time — The Inner

Coat

The Male Organs of Generation

Coat is an exceeding fine thin membrane. Anatomists say that it is Villous like the stomach & Intestines, but it has no Villi: The Use of the internal membrane is certainly not for strength, but by its closeness of Texture to confine the Urine, which would otherwise get thro' the muscular Coat. The Apertures on the inside of the bladder are three, two by which the Urine comes in from the Ureters, & one by which it goes out into the Urethra; the Orifice of the Ureters are very small, of an oval shape, & opening obliquely so as to admit a probe with difficulty. The Ureters run slanting thro' the Coat before they open internally, they make a ridge on each side in the inner coat, which ridges running on from the Orifice meet at the Prostrate Gland. This slanting direction serves all the Uses of a Valve, the urine goes into the bladder drop by drop, but cannot return because the internal coat is pressed against the other side of the Orifice so as to stop it. At the inside of the Urethra which makes the third Orifice, there is nothing Valvular. From a thickening of the substance of the bladder in consequence of frequency & difficulty in making water, it happens that the Ureters lose their Valvular insertion, so that the Urine when the bladder contracts is forced up the Ureters, the consequence of which is, the Ureters become dilated & so does the Pelvis of the Kidneys. Patients have been cut for the Stone by making an Incision above the Os Pubis &c as was mentioned before. But to return to the male

Organs

Organs; Having considered them in the course of the secretion of the Semen, we shall next consider them in the Excretion, and principally the Vasa Deferentia & Vesiculæ Seminales become Cellular & communicate with them & from each Vesicula Seminalis & Vas Deferens goes a Duct which all unite into One when they first enter the Prostrate Gland – Lyolialis first said that the Vesiculæ Seminales were not Cellular, but that they were a continuation of the Tubes of the Vasa Deferentia convoluted, or like a long bag crumpled up together. But besides being a tube they branch like a Stag's horn throwing out lateral cavities – the Use of the Vesiculæ is supposed to be that of a Reservoir for Semen to remain till a quantity is collected & wanted for Coition – But Mr John Hunter is of opinion that they dont contain Semen, but secrete their own fluid, which is of a greenish brown colour totally different from semen – Upon examining the Vesiculæ Seminales of a man whose head was shot off, the fluid was found of this colour – A man died in St George's Hospital who had formerly had one Testicle extirpated, he then conceived that if the Vesiculæ Seminales naturally contained semen, that now one Testicle was gone the Vesicula of this side must be wasted, but upon examining the man's body, the Vesiculæ Seminales of both sides were equally full & turgid as ever & the fluid in them was of a greenish brown colour – To support the doctrine of the Vesiculæ Seminales being Reservoirs for Semen against Coition, it was said that a man thinks for some time on Coition, before he goes

goes to it, that during that time the semen is collecting in the Vesiculæ Seminales so that he may be prepar'd, but that a Dog copulates without any previous thinking on it, therefore he has the semen to prepare during coition, & remains so a considerable time for that reason, & therefore on this account he has no need of Vesiculæ seminales, accordingly he has none — The prostrate Gland is an oblong body with a notch at its Basis, where the two common Ducts of the Vesiculæ Seminales & Vasa Deferentia on each side enter — It is a firm Glandular substance full of white mucus especially in young men which flows thro' Ducts opening by several Orifices on the sides of the Caput Gallinaginis, & by pressing the Gland the mucus may be squeezed out of them into the Urethra — The Use of this mucus is not known, no more is that of the Liquor of the Vesiculæ Seminales; From this appearance of mucus the Prostrate was supposed to be the seat of a Clap & that it was matter, but this is plainly not the case, tho' seemingly divided into two lateral portions it is one & the same body; Along the side of the Urethra on the Prostrate Gland is a longitudinal Ridge, broader behind & loosing itself gradually as it goes forw-ards in a narrow point this is called Caput Gallinaginis from it's supposed resemblance to the head of a Wood Cock, call'd by others the verum montanum, from its making a little mount in the Urethra, & its narrow part appearing like a spit — The two openings of the Vesiculæ Seminales on each side of the broad part, are called the

Eyes

Eyes of a Wood Cock, & besides these two holes there is a third as it were between them, it is a small Glandular Follicle, or blind bag. We have said that there is sometimes a difficulty in introducing the Staff, it arises from the end getting into a cavity under a shoulder made by the Basis of the Prostrate, by withdrawing the instrum-ent a little to disengage it from the cavity & raise the end, it may easily be pushed clear of the shoulder into the bladder

Cowper's Glands are just under the membranous part within the bulb of the Urethra one on each side, they have a Duct that runs considerably forwards & opens into the Urethra. Now the Urethra from the membranous part of the Glands to the inner membrane, of introducing an instrument especially a rough Catheter & about it there are a number of little Glandular Follicles, or blind Lacunæ analogous to those orifices of Cowper's Glands; there is commonly a pretty large one on the upper side where the Urethra makes a Turn under the Frænum to go thro' the Glands, these Lacunæ are often so large as to receive the end of a small Candle & will stop it if we do not follow the Turn of the part in introducing it, to remedy this, withdraw it a little & by pressing the end downwards, push it forwards & it will readily pass

Lect 32d

The Male Organs of Generation

Lecture 32d

We know nothing of the Glandular secretion of the Testicles; that their Office is to secrete the Prolific Semen is evident from Castration rendering a Man incapable of getting a Child; but how this change is produced in the Gland so that it has properties it had not before we don't know; we cannot inject Mercury or any other fluid into the secretory or Excretory Vessels by the Artery; besides this there is the Prostrate Gland, a considerable One which throws out a fluid into the Urethra, the use of which we don't know nor that from Cowpers Glands, neither are we acquainted with the glazy ropy fluid that oozes out from All the Urethra. We dont know the Use of these farther than that they serve to defend the inner Membrane of the Urethra from the Stimulus of the Urine. One of the most common diseases to which the male Organs are liable is the Gonorrhea which generally speaking is an increased secretion of mucus from the internal membrane of the Urethra, & when not owing to Venereal Poison is occasioned by sharp Juices in the constitution, tho sometimes it is quite local in its cause; in Women, more especially those of tender habits it is very common, more so than in Men

The Venereal Gonorrhea is known to be an inflammation of the internal membrane of the Urethra for the most part, & brought on by the Infection of Venereal Poison. Some have thought that the discharge flowed from the Lacuna, others from the Prostrate Gland, & others from the Vesiculæ Seminales; it is pretty plain however that the Clap affects not only One part, but every part of the Urethra, that is, tho' at first it affects only one particular

part

The Male Organs of Generation

part, it spreads from place to place till at last it affects the whole. The Venereal poison affects parts only that are without a Cuticle or where the Cuticle is very thin, which is the Reason why the Urethra is so often affected & not the skin of the Penis, so that we see a Gonorrhœa is sometimes internal from the Urethra & sometimes external from the Glans where the Cuticle is very thin, in both there is a copious discharge of mucus like Pus which gradually diminishes & sometimes cures itself, tho' not often. Mercury being a Specific internally for the Venereal poison has led many to use it externally to destroy the poison on a particular part, & seems to have been successfull, but as it has been said to have proved hurtfull sometimes, it is not to be recommended very strongly, when thus used the best way of preparing it, is by killing the crude Mercury with Gum Arabic; If there be any little crack in the Cuticle or little sore any where about the Penis, a Chancre is the consequence of the Application of the Poison to that part, tho' there may be a Clap notwithstanding. From a Venereal Ulcer there is danger of Absorption of matter & affection of the general habit, & therefore this is often seen in the case of a Bubo & Ulcers of the Tonsils &c. As there are external Chancres on the Penis, so also there are internal Chancres in the Urethra, which in healing form a Cicatrix & puckering up of the inner Membrane so as to contract the passage of the Urethra. The Corpora Cavernosa are generally equally distended & hard in Erection of the Penis, but from a Cicatrix on one or both of them, they are sometimes prevented

from

The Male Organs of Generation

from being equally distended — A young Man had the Corpora Cavernosa broken & when healed there was a Cicatrice, that made the Penis form a right Angle when erected by drawing the end of it always to one side — We come now to speak of some of the diseases of the Testicle — the most common is the Hydrocele or a collection of water in the bag that contains the Testicle, the Tunica Vaginalis; sometimes the water is contained in two or more bags, for an Hydatid may be formed in the Cellular Membrane round the Tunica Vaginalis as well as in any other part of the body, which pushing the Coat inwards will make a Tumor distinct from that caused by the water in the Coat, but this is not properly Hydrocele as the water is not within the Coat; when there is more than one Hydrocele it is probably owing to inflammation having made Adhesions of the Coat to the Testicle so as to form distinct bags in which the water is collected; with the Hydrocele there is often a disease of the Testicles at least of their Coats; when this is the case, the Radical Cure is forbid being attempted by All prudent Surgeons — The Testicle often becomes Scirrhous, sometimes the Scirrhus is only in the Tunica Albuginea, but most commonly it is in the substance & like other Glandular parts it now & then becomes Cancerous — Mr Hawkins has a Painting done by Mr Hogarth of a Cancer of the coat of the Testicle, when the substance was perfectly free from it — Sterility happens in both Men & Women more generally however in the latter; what this is commonly owing to

we are

we are not able to say. Sometimes however it may be owing to an evident alteration in the Organs of Generation; upon opening the body of a Man it was plain from two reasons that he must have been incapable of begetting a Child. In the first place if the Testicle had ever prepared any Semen, there could have been no passage for it, for the Epididymis in both Testicles terminated in a blunt point & tho' there were Vasa Deferentia they had no connection with the Epididymis, but ended before they arrived there, & secondly the Vesiculæ Seminales were far removed from the Prostrate Gland & had the Vasa Deferentia entering them, but from the Vasa Deferentia or Vesiculæ Seminales there went no Duct at all, so that the Semen if any had been prepared, could not possibly get into the Urethra, but must have been absorbed & carried into the blood. We have already said that Sacculi are formed in the bladder from a Stone stopping the Urine; & the bladder contracting on its Contents, the Urine forces the inner coat thro' the Muscular One; the same thing happens from an enlarged Scirrhous Prostrate Gland. In old People this Gland is often enlarged & sometimes to such a degree as to fill up the cavity of the Pelvis, & thrust the bladder above the Pubis, & the inner coat of the bladder hanging over the Orifice of the Urethra like a Valve, stops the Urine, the same thing happens as in the Stone, a difficulty of introducing a Catheter or Staff may arise from this enlargement, & then the method of raising the end can't be so serviceable. It is said that when we cannot introduce a Catheter & the suppression of Urine begins to be dangerous, we must puncture the

bladder

The Male Organs of Generation

Bladder with a Trocar — now when there is a large Prostate Gland which may be known by examining it, this cannot be done below the os Pubis, because the bladder is at a great Distance & must therefore be done above the Pubis — It has been much disputed, whether there are ever any adhering stones in the Urinary Passages; it is certain though stones do adhere to the internal membrane of the bladder by entangling with it & not as a living part; Calculi are found in the Orifices of the Lacuna about the Caput Gallinaginis, so that sometimes the substance of the Prostate Gland seems full of them, which tho' small give the same feel as large stones & might deceive us greatly. It is probable that some of the Patients who have been searched & said to have a stone in whom none was found, upon cutting have had this complaint, we should therefore be very much upon our guard — The most common cause of a stricture in the Urethra is a Cicatrice from the healing of an Ulcer of the inner membrane from an old standing Inflammation & Ulceration there is a puckering up of the membrane which contracts the passage & occasions a difficulty of making Water — Le Dran supposed the Obstruction in the Urethra was caused by little fungous excres-cences, but these are never found — Beyond the stricture some-times a suppuration comes on, the Urine makes it's way thro' the Skin externally, & forms the Fistula in Perinaeo; instead of coming thro' the Orifice in the Glans, the Urine comes thro' these new ones; but when this is the case, the Canal of the Urethra that before was only contracted, sometimes closes altogether, part of the natural passage is obstructed, & the water continues to pass regularly thro' the hole from the Urethra to the Perinaeum —

Diseases of Bones

Every Disease of a bone except Fracture has been called Caries. But a Carious bone is different from a dead One, it continues alive & changes it's Texture, which a dead One does not. Caries is a disposition in a bone to change its texture from a kind of inflammation & is generally incurable; the bone is diseas'd thro' & thro' & no part of it becomes dead till separated from the rest. sometimes a piece of bone becomes dead in the middle of a Caries, separates from it & is loose, it remains unchanged in its texture, while the Carious part is very much changed; this change is very evident in 24 hours. The Venereal poison is very apt to affect the bones of the Skull & make them carious, but we always find a Remedy in Mercury. When the Skull is eroded thro' & thro' by any Means whatever, it may be known by the rising & falling of the Matter in the holes of the bone, in consequence of the Motion of the Dura Mater. Bones are more apt in some Subjects than others to run into one another, from the redundancy of the Ossific Matter, as we see from the closing of the Frontal Suture; & firm union between the bones of some Pelvises. From Disease the bones are often eroded, or otherwise altered so that if by any change in the constitution the disease should stop, they grow together more especially in the Joints, & are always incurable. In Scrophulous habits it frequently happens, that there is a long continued inflammation & ulceration among the bones & the disease stopping as it sometimes does in young People the bones anchylose. It is plain that there is no such thing as an incompleat Anchylosis.

Bony

Diseases of Bones

— Bony substance when diseased is capable of changing its form thence in the Spina Ventosa a small bone often becomes exceedingly large by a shooting out of the bony parts, there are cavities made in the bone, & water or Gelatinous Matter contained in them — When more confined & shooting out from a small part only, it is called Exostosis, when confined still more, a Node — Bones sometimes swell out making an irregular surface without & within & become very spongy, at other times we find them eat away into cavities — which are filled with blood, which seems to prove that the blood has a power of Dissolving bones — Dr Hunter in dissecting a body found that the substance of the Ribs in several places was entirely gone, while the Periosteum remaining made cavities which contained Clots of blood, like recent ones in appearance — A Man who used to sell old Cloaths had a swelling on his head, which gradually increased till it became very large, when he died the head was examined & the Tumour found to proceed from blood, within the Skull was a fungus that had eroded the bone & thrust it out into a large efflorescence like appearance, with a number of little cavities fill'd up with a Gelatinous kind of flesh —

Lect 33d

The Cutis Cuticula, & Rete Mucosum

Lecture 33^d

The Cellular Membrane, Panniculus Carnosus, Cutis & Cuticula have been reckoned the Integuments of the body, but the first is no general covering; as for the Panniculus Carnosus it is not to be found in the human body, in Quadrupeds it is, & it is a thin layer of Muscular Fibres immediately under & attached to the Skin properly so called; in Dogs it is very evident & is that Muscle by which they shake their skin so quickly to throw off wet — These two then we reject from among the Integuments, & to the other two add a third which lies between them, to wit, the Rete Mucosum; first of the true skin, This is a pretty firm tough Membrane, & is that substance of which Leather is made, it is of a different thickness in different parts of the same body, generally it is thickest behind on the back and neck, & thinnest before, very thin in all bending parts; It is observed by Linnæus & other Naturalists, that Animals in general have their skin thickest on the back part of their body, & by examining a peice of Leather we find, that the part which covered the back of the Animal is thickest — The Skin has some degree of Elasticity, for if it is pinched up on the back of the hand for instance & let go again, it becomes smooth — It is probable tho' that the case of the case of the Man in the Hospital of Amsterdam is much exaggerated, for it is said that his skin was so Elastic that he could draw it up on his shoulders & bring it forwards over his head & face like a Cloth, & that if he lett it go it would return instantaneously

Cutis Cuticula & Rete mucosum

instantaneously to its proper place — It is most probable the Elasticity we observed, depends as much if not more upon the Cellular membrane connected with the skin below, for we cannot pinch up a bit of skin without taking up at the same time a number of fibres of Cellular membrane — The substance of the skin according to Winslow is a firm texture of interwoven fibres like a piece of Hat — Dr Nicholls used to shew a bit of Shamois Leather to illustrate this by tearing it, but this preparation was a deception & the fibrous appearance was owing to its Vascular texture

It is a substance that contains but few vessels capable of carrying red blood unless when inflamed, its Vessels however are proved to be very numerous by injection; it appears to be Cellular membrane condensed & become less porous, & is organiz'd in a peculiar manner; the Cicatrice of a wound in the skin is Cellular membrane, not the same in its Organization as the first skin is, for in working of Leather in scraping off the Cellular membrane if there is any Cicatrice in the skin it comes out & leaves a hole there; this the workers of Leather say is always the case; the inner surface of the skin is supposed to be made unequal by the Roots of the Hairs, & the cutaneous or miliary Glands; Authors have talked very much at Random about the miliary Glands; as a Proof of their existence, the Goose skin as it is called was brought for it was said that those little eminences were those Glands, & that the red spots observable on the inside of an injected skin were

the under sides

Cutis, Cuticula & Rete Mucosum

the undersides of them; but from these we can plainly demonstrate that the hairs come, they are the Roots of the Hairs. On the skin there is a secretion of a Greasy Mucus to keep the hair soft, which is probably caused by a peculiar Organisation placed at the Root of the hair, but what the Miliary Glands are we dont certainly know. The Sebaceous Glands of the skin secrete a particular kind of Mucus which may be squeezed out like a Worm generally of a white colour, tho' when there is a little black speck if you squeeze it, the Mucus comes out black; The Use of the Sebaceous Glands is to seperate a fluid to preserve the skin from the ill effects of Cold, Dry air & Heat; therefore Negroes who are exposed to great heats have a larger quantity of them on their skin, & its being secreted in a greater quantity about the Nose is perhaps to defend the skin there from the Air of Respiration continually passing over it; when it dries in a little Follicle there is an Itching, we are immediately led as by instinct to remove this by rubbing & scratching the part, by this means the Mucus is pressed out & smeared on the skin & the itching ceases. These Glands are different as we see by the different kinds of Mucus that they secrete) in the Axilla it is a Musky kind of smell, in the Pudenda of a very peculiar One & both very different from what it is about the Nose, & the Appearance is very different, at the Nose it comes out of evident holes, but at other parts it comes out of small imperceptible pores; it is different in consistence too, at the Nose it is firm enough to take a worm like appearance & in other places it is very thin. The Vessels of the Skin are very

Cutis Cuticula & Rete mucosum

very numerous & so also we judge the nerves to be, the Vessels are seen going into it every where from the Cellular membrane in great Abundance if injected, & from its great sensibility we conclude it to be exceedingly nervous, tho' we cannot actually trace the nerves into it - The outer surface of the Skin is marked with a number of deep furrows, the meaning of this contrivance is to allow of its bending where it is thick with freedom as in the hands & forehead - The skin of the Rhinoceros is very thick & therefore these furrows are very remarkable making a number of folds - Besides the large furrows there are smaller ones, the use of them is just the same so that the skin is larger than the surface of the Part to allow of swelling from Fat, water, Inflammation, or otherwise, therefore when swelled it is even & smoother than when not, & fat People are commonly smoother skinn'd than lean Ones, the Skin by means of these furrows is as it were grained, for which reason the best Statuaries in imitating the human skin rather chuse the marble should be unpolished than polished - Malpighi was the first who observed the Papillæ Pyramidales & Villi of the skin; they are most conspicuous on the Palms of the Hands, Soles of the Feet, Glans Penis, & Lips - on the other parts of the skin they don't appear till the Cuticle & Rete mucosum are removed & to see them any where the skin must be first injected, when they turn out to be exceedingly vascular - In the Hands & feet they are planted in regular ridges, not so on the Lips & Glans Penis & every ridge is made by a double Row of Papillæ - The Cuticle and

Rete

Cutis Cuticula & Rete mucosum

Rete mucosum not only cover them, but make sheaths for each Papilla

In Inoculation as it is now practis'd, the summit of these Villi are just wounded, — the nice sense of Touch so peculiar to the Glans, & Hands depend upon these Villi projecting beyond the rest of the skin, so as to catch the most minute objects — The skin itself is every where the Organ of Sensation, — the Cuticle & Rete mucosum are so much alike, that it is better to demonstrate them together — By blistering or scaling a part, or by letting it pass toward Putrefaction the Cuticle seperates from the true skin, & along with it the Rete mucosum; by this means we can generally tell whether a Child is still born or not, for if it had been dead in the Uterus any time, it will be putrid, & the Cuticle will be seperated in many places; In some parts of Animals it is scaly, but whether it is so in the human body is not determind, it is horny & inorganic not appearing to have either Vessels or nerves & is capable of being made very thick by hard Labour, — tho we cannot discover the Cuticle & Rete mucosum to be Vascular, yet the number of fine threads discernible between them & the Cutis upon seperating them from it, may for what we know be small Vessels connecting them to it; if these threads are organized, they are the smallest organs that are demonstrable in the body, & Dr Hunter believes they are the organs of Perspiration —

They are both larger than the Part of the body they surround, because they enter into furrows of the Cutis, — the black of a Blackmoor exists —

exists in the Rete mucosum only, in him it is plain there are two Coverings over the Cutis, but it has been doubted whether the Europe-cans have two, it is pretty evident however that they have both Cuticle & Rete mucosum — In all of us the Cuticula is white or transparent & the different complexions of Fair, Brown, or Black, depends upon the different colour of the Rete mucosum — the marks made by People on their Arms & other parts are in the skin, for if the Cuticle & Rete mucosum are picked off, the marks will remain in the Cutis, the hands of Dyers are coloured by the Cuticle being dyed like as on horn in the Cuticle has been thought to be an inspissated mucus, but what its substance is is not certainly known — The Use of the skin is to give a smooth surface to the body, to be the organ of absorption; the Cuticle serves to prevent the disagreeableness of too sensible touch, for a man, not used to work by handling bricks, or any such rough body has quickly the Cuticle worn away & his hands become very sore, which a Bricklayer that handles them all day long has not his hands altered by; It serves by its closeness of texture to keep in the moisture of the body, for in a dead body where a blister has been applied, & the Cuticle come off, the skin is always dry, but where that is on this is always moist, it confines in the moisture — The two most common diseases of the skin are the Itch, & the Vena medinensis, or Guinea Worm — the Itch whether its cause be animalcula, is occasion'd by a Poison, sui generis, it is infect-ious, & as certainly cured by brimstone, as the Lues Venerea is by Mercury

Mercury. — It has been said that particular that kinds of food occasion this disease, but that is false, it most commonly happens among the lower Class of people from their Uncleanliness. It has been supposed to be unsafe to cure the Itch, because by so doing bad Effects have been produced, but to cure the Itch is never unsafe. The Mischief arises from the Mercury or brimstone exciting an Efflorescence on the Skin. The Vena Medinensis is very common among the Africans, & only attacks Natives of the Country, it breeds in the skin, & where it makes its appearance there is first a little livid spot, which breaking the head of a Worm is discovered & may be drawn out by degrees to a very great length, if not hastily done. — Nails & Hair are appendages to the skin, they grow as plants do by Protrusion from the Root, which is very evident by observing the white Specks in the Nails. The Nails are horny & are not Elongations of the Villi as was supposed, for they come off from them along with the Cuticle & Rete Mucosum, & seem made of the same substance, indeed they appear to be continuations of them. Hair is fibrous, horny, & solid too, its Roots are bulbous fed by vessels, which probably bring the Matter of which Hair is made. The Bulb contains a glary fluid, the hair comes off by Putrefaction along with the Nails & Cuticle. A Foetus of four Months has its body cover'd all over with hair set in regular rows & circles of which considerable quantity is afterwards lost. Hair in some Animals, more particularly the northern Ones, is given for Warmth, but in the human Body this cannot be the case, its principle Use seems to be to force us to be clean by

entangling

entangling readily with any filth so as to make us wash often —

It has been said that the Hairs grow after Death, but upon enquiring into this by the examination of bodies at different times, there appears to be no foundation for this Assertion — the Passions of the mind are said to have effect upon the hair, & Cases are related where from fright black Hair in one night's time has become white; as this is so well authenticated it is not rashly to be denied — Dr Hunter was told of a Cow that being frightened at water was changed into a white one in twenty four hours —

What Disease of the Hair that is which is called Plica Polonica, we are not acquainted with, the most probable account of it is, that it is no more than a scabby head from nastiness, which the Poor Poles are much addicted to —

Lect. 34th

The Insensible Perspiration

Lecture 34th

Some Physiologists have thought that sweat & perspiration were secreted by different Organs, but they appear to be entirely one & the same thing; Sweat comes on when the body is warm & after exercise, and by relaxation of the Vessels as after fainting; Perspiration comes out insensibly from the body & continually it becomes conspicuous by sitting in a Chariot with the Glasses & by holding the hand near a cold piece of glass, for the Matter of perspiration will collect on the Glass in the form of a fine Dew & encrease till it runs down in little streams; In speaking of them we shall call them perspiration sensibly & insensibly. That animals throw off water from their bodies sensibly is evident from sweating in warm Weather, & that they throw it off insensibly is evident from the water collecting on the Chariot Glass in cold Weather, when no Moisture can be perceived on the Skin. We dont know what Hippocrates thought of insensible perspiration; Sanctorius observ'd it very minutely & found the quantity of it to differ at different times; it passes off by the skin & Lungs; we cannot imitate it, as we never can make an injection pass the Cuticle. — At the same time as the body is Emitting it, it is absorbing also, which is proved by applying Mercury to the Skin, & its affecting the salivary Glands, or by applying Garlick & its giving the Urine its own smell, so that the calculation of the quantity of insensible Perspiration in a given time must be erroneous, on account of the body absorbing at the same time. When we drink a large quantity of watery fluids, we perspire more than when we drink less & in

warm

warm Weather we perspire more, & sweat easily, so that a smaller quantity of Urine passes by the Kidneys — In cold Weather we perspire less & sweat with difficulty so that more Urine is secreted — Sanctorius in Italy found the Perspiration generally as 10 to 4 of Urine — In France it is not twice the quantity of Urine — Keil in England found it as 3 to 2 of Urine — In Holland it is much the same as in England; In old People the Perspiration diminishes & therefore their skin is dry & itches much & of course more Urine is secreted, which make the stone in the Urinary Passages of them so exceedingly distressing, by the frequency of their inclinations to make water they are continually harassed — Calculous Concretions are most commonly formed in the Urinary Passages, & in every part of them, in the Tubuli & Pelvis of the Kidney, in the Ureters Bladder & Urethra — They resemble stones so much, that they are called, no doubt in all Languages by that name; we shall first consider the Urinary Concretions — The Common Idea is, that they are a Deposit of the Earthy part of the water, but this is ill founded, for they are formed by Crystallization, as is the Tartareous Crust on the Teeth — Their texture by examining one of the smallest particles or a Grain of Gravel with a Magnifyer, appears plainly to be that of Crystals this property of Crystallisation prevails in one Constitution more than in Another, as we see by some people continually passing these concretions, & others that never do — Fluids dispos'd to Crystals go on to Crystallization quicker from having a Proper surface to fix upon, accordingly in making sugar candy they suspend pieces of threads in the Liquor to invite Crystallisation, & when the first Crystal is formed that affords a convenient surface for more to fix on &

on, and those for more, & so on till a large mass is formed; So it is in the Urinary Passages, if any thing affords a proper surface a Stone is produced; Some things invite Crystals more than others — Mr John Hunter made a number of experiments to determine what were the most inviting, by putting them into a Pott & making Water upon them & letting them remain for a considerable time; he found that Hair was soonest crusted over with Crystals — Dr Hunter has a Lock of Hair so crusted over that was taken from a Woman afflicted with the common Symptoms of Stone & likewise another, in both which cases it is most probable that the hair had been pushed thro' the Urethra into the bladder — Hair commonly grows upon the external surface of the body only, it has been found nevertheless in the interior part, particularly the Ovaria of Women along with a gelatinous fluid where it could not have got to from without, so that it seems these parts have a power of forming, (if not hair) a substance very much like it — Stones are generally laminated, therefore cannot be supposed to be formed by deposition, but this may be accounted for by supposing that they are formed by Crystallization, & the Lamina are regularly round for the most Part — Dr Fordyce has found from a number of experiments, that the matter of these Crystalls is Animal Earth & animal mucus, & thence concludes that a Calculus has two Dissolvents, that is, what will dissolve the Earth, & what will dissolve the mucus — An Acid, the Marine for instance will take out the Earth & leave the mucus soft as it does in a bone The mucus may be dissolved by long steeping in Water so that it putrefies & the Earth will drop from it — The human Calculus is known

from

Calculous Concretions —

from the common Pebble stone by burning it, for it will emit the peculiar smell of Animal Substance that is burning, whereas the other emits not any — By this means we can certainly detect the Impositions framed by Designing People to extort the Compassion & Charity of Good natured Folks, pretending to be severely afflicted with stone & that they have passed some which they shew; they differ in colour being from almost a jet black to an almost perfect White, commonly they are brownish, or yellowish — Those stones which are not laminated we call irregular Crystallizations; there are two species of Laminated stones, the One Simple & the other compound; in the simple the Laminae are regularly laid round one Center, & every transverse section of them give Circles; Compound when in a transverse section the Circles are not uninterruptedly round but in & out Scollopwise, yet each circle having the same Center — These kind of circles particularly appear in what is called a Mulberry stone, or that with an uneven surface, whereas the simple has for most part a regular surface — The disposition of the Lamina is very evident in the large Intestinal stones of an Horse, all having their Center in the nucleus or part first formed, & the simple may in its first formed Lamina have been a Compound, or the Compound a simple, by changing the form of their Circles; sometimes there are two centers in one stone, & the circles become Ellipses — Generally the Crystallization is equal every where & the stones are pretty nicely rounded, but some they are unequal from a disposition of the Crystallization to

advance —

Calculous Concretions —

advance faster on one side than on another, & then they take all manner of forms — After having extracted one stone, to know whether any more remain we are directed to look if the stone has a polished surface, & if it has there is another at least, but this more polished surface is no proof of there being more than one stone; if they are flat surfaces or hollow which are polished, we may pretty certainly conclude that more stones remain —

If the stone lies in the bladder at ease so that the Urine can flow all round it, then it is commonly pretty round, but if by any means it is confined to any Part of the bladder, then it is pretty frequently irregular. It now & then happens that the stone has a process continued from it into the Urethra, which takes greatly the form of the Prostrate Gland

Thus far of Calculous Concretions in the Urinary passages — Stones are found in the Intestines of many Animals particularly in an Horse especially in its Colon — Farriers often suspect this & rake the Horse as it is called, they thrust their Arm up the Rectum & draw away the stones; they are Laminated, & made of the same substance & in the same manner as the Urinary Concretions; In some Animals they are called Bezoars; in them particularly is to be seen the Crystallizations of the Circular Laminæ shooting from the Center towards the Circumference

The soft Concretions of the Intestines are not Calculous, but formed of undigested fibres of Vegetables used for Food, for by burning they do not emit that peculiar smell which the others do; Another of the soft kind is like the Hair Ball formed principally in the Stomach of Calves, & only in such Animals as are hairy — There is no doubt of their being formed by the Animal licking it self & swallowing the Hairs —

The Particular Muscles

Lecture 35th

We begin with the Head, and go downward omitting the Abdominal Muscles which have been already described. The Scalp is moved by a pair of Muscles called Frontalis & Occipitalis, these two are joined by a Tendon at the Top of the Head, so as to make a Digastric Muscle & has been called Occipito-Frontalis generally; from it's interior part go down some fibres along the Dorsum Nasi, called the Nasalis Muscle. The Orbicularis palpebrarum is fixed by a Tendon to the bone of the Nose at the inner Canthus of the Orbit, it not only shuts the Eyelids, but brings also the Skin of the Face towards the Nose. The Reason why the upper Eyelid alone is generally moved in opening & shutting the Eye is, because the Attachment of this Muscle is below the Middle of the Eye. The Rectus, Lateralis, & Transversalis Nasi are properly as Albinus makes them, parts of the Elevator Labii Superioris Alaeque Nasi, & of the Depressor Labii Superioris Alaeque Nasi. The Muscles of the Angles of the Mouth are all placed in a radiated manner to pull it in a great number of Directions; Levator Anguli Oris drawing ye Mouth upwards; the Zygomaticus Major upwards & outwards; the Buccinator drawing it directly outwards or backwards, & the Triangularis with the Addition of the Platisma Myoides directly downwards. The Platisma Myoides is analogous to the Panniculus Carnosus under the Skin of a Dog & other Animals, for below its fibres are fixed to the Skin of the Neck & Breast & moves it; above it is fixed by a Fascia into the Angle of the Mouth along with the Triangularis or Depressor Labiorum Communis, it pulls the Angle of the Mouth downwards, & assists in pulling the Lower Jaw downwards, it lies over the external Jugular Vein & of course is wounded in bleeding in that Vein. The Zygomaticus Minor comes from the Brim of the Orbit near the Zygoma, & joins the Levator Labii Superioris Alaeque Nasi, it is properly only a portion of that Muscle. The Masseter is a very strong Muscle, its office is to shut the Mouth with great force. The Temporal Muscle is covered with a strong Tendinous Fascia, it arises

from

from the outer Surface of the Skull, & from the inner surface of the Skull and from the inner Surface of the Fascia also; it is attached to the Coronoid Process of the Lower Jaw, & pulls that upwards — When Inflammation and Suppuration come on under this Fascia there are often most violent symptoms attended with excruciating pain & affection of the Brain, the Matter if let loose makes its way into the mouth — The Reason why this is so is evident, all inflamed parts that have not room to distend are very painfull, & the Fascia not allowing of distension causes therefore that severe pain, when Matter is formed too the Fascia confines it, so that it can take no course but that of the muscle downwards between it and the Fascia, so that it passes under the Jugum down to the Coronoid process, and near it makes an Opening into the mouth; — The Surgeon may however prevent the Matter going so far, by making a puncture with the Lancet thro' the Fascia; when he is certain of the case, & it ought to be done as soon as possible after Matter is formed. — The Sterno-mastoideus arises from the Sternum & forepart of the Clavicle, & is attached to the mamillary Process of the Temporal Bone & for some considerable Way back to the Ridge in the Occipital bone; it is said by Albinus to be two muscles — When both the Sterno-mastoidei muscles act, they bring the head forwards & downwards; when only One acts it draws the head downwards, & also turns the face towards the opposite Shoulder — When this muscle on one side grows rigid, it makes what is called the Wry neck, & to cure the Deformity Surgeons direct the muscle to be cut thro', but we should be always careful to examine into the State of the Other muscles, for if any One else is rigid the cutting this thro' will have no Effect, the Deformity will still remain —

Dr Hunter was advised with about a Lady, who had a Wry neck His Opinion was asked whether cutting the muscle thro' would be of any Service

Service. Upon examining the case, it proved to be a Palsy of the muscle on one side of the neck, so that the muscles on the other side drew the Head towards that Shoulder, and turned the face that way. By a piece of silk fixed to the Shoulder of the Gown on the sound side, and holding the end of it in her mouth, she could keep her head tolerably well in it's proper position, she was not therefore a fit subject for the Operation, we should when advised with on this matter inform ourselves of every circumstance, least after having cut the muscle, we should be Disappointed in removing the Deformity.

Lect. 36th

The Muscles of the Neck &c

Lecture 36th

The Os Hyoides has it's Basis situated on the angle formed by the Neck and Head, and it's horns run backwards; on each upper side near it's Basis is a Penniform Process from which a Ligament goes to connect it with the Styloid Process; the Ligament is sometimes found Ossified —

The Upper part of the Wind=Pipe which is much enlarged is called Larynx; it is made up of five Cartilages — the Thyroid or Scutiform Cartilage lies under the Os Hyoides, it makes the Pomum Adami; the Notch in it's forepart may be easily felt with the finger, and thereby it may be perceiv'd that this Cartilage goes up under the Os Hyoides in Deglutition; it has two ascending processes connected with the horns of the Os Hyoides, and two descending which are moveably connected with the Cricoid Cartilage; under the Thyroid lies the Cricoid, it's surface before and behind is divided into two Lateral Cavities for muscles; the other three are the two Arytænoid Cartilages, and the Epiglottis. — Between the Pectoral and Deltoid Muscles runs the Cephalic Vein to enter the Subclavian Trunk — Several Muscles of the Clavicle and Scapula are attached to the Ribs — Asthmatic People raise their shoulders while they breathe, so that these muscles raise the Ribs higher in Inspiration and enlarge the Chest more — The Subclavian Vessels come out over the first rib under the Clavicle and Subclavius Muscle behind and under the great and little Pectoral Muscles, and run under the short head of the Biceps and Coraco=Brachialis down the Arm — In Amputating at the Joint we must divide the Pectorals, Coraco=Brachialis, and short head of the Biceps, before we can get a View of these Vessels with their

their nerves — In amputating the arm at the Joint modern Surgeons do not use a Tourniquet, pressure may be made similar to that of a Tourniquet by throwing the Shoulder upward and backward and pressing with the Thumb upon the Vessels over the Rib — Each of the several parts of the Cucularis may act singly, and either pull the Shoulder upwards downwards or backwards — The Trapezius and Latissimus Dorsi Dr Hunter calls the Fascia of the Loins, and are two broad muscles situated immediately under the Integuments and covering all the back; when these two are removed the Rhomboides appears ——

The Muscles of the Back &c.

Lecture 37th

The Sacro-Lumbalis, Longissimus Dorsi and Semi-Spinalis are best considered as only One Muscle, reaching from the Pelvis all along the back & Neck to the head, filling up the Cavity between the Angles of the Ribs and Spinal Processes of the Vertebræ. — From the Occipital Ridge upwards is called the Arch of the Skull, & from that downwards the Basis of the Skull. The Joint of the Lower Jaw has a Moveable Cartilage within it whenever the Condyle plays, whether backwards in the Cavity or forwards on the eminence of the Temporal bone. It dont appear to diminish friction, but to vary the Motion of the Joint, for it moves backwards & forwards along with the Condyle, & lies between it, & the bone, tho' Mr John Hunter observes that Animals whose Condyle plays only in the cavity, & don't vary it's situation, have this Moveable Cartilage, so that it's precise Use is not ascertained. The fleshy part of the Tongue is most probably a body composed of little Muscles to bring out it's various actions, besides those Muscles coming from the Neighbouring parts, & the Lingualis. By long practice these Motions are determined to a great Nicety, as we observe by the pronunciations in different languages, so that a native of one Country cannot imitate the pronunciation in the language of another, to which he has not been accustomed. When a Child grows up, it's not being able to speak don't always depend upon a fault in the Tongue, but is sometimes owing to it's not being able to hear, so that what it has not heard it cannot imitate, which was the Case of a Child brought from Ireland to Dr Hunter. It is from imitation alone of what we hear, that makes us begin to speak.

The

The Pharynx, Palatum &c &c Fauces, Heart, &c

Lecture 38st

The Pharynx makes a sort of Funnel to the Œsophagus, it is a Muscular Bag which by contracting forces the food downward into the Œsophagus in Deglutition. It is best to consider it as a Muscular Bag & not as having many Muscles, for they are by no means distinct, except the Stylo-Pharyngaeus which draws the Pharynx upwards & backwards — There may be said to be two Palates, the Palatum Osseum or bony Palate & the Palatum Molle of which the Uvula is a principal part. The Palatum Molle hangs as a Valve in the Larynx between the cavity of the internal Nostrils, & that of the Mouth, it has the Uvula depending from it; when we breathe thro' the Mouth, & do not suffer the Breath to pass thro' the Nose, the Palatum Molle is raised up & pressed against the back part of the Pharynx so as to cut off the communication with the Nostrils; when we breathe thro' the Nose only, then it is pulled down against the Root of the Tongue, & shuts up the passage from the Pharynx to the Mouth: This we can do at pleasure & by looking in a Glass can see the Palatum Molle raised and depressed. In general it hangs so as not to impede the passage of the breath thro' either Mouth or Nostrils. — On looking in the Mouth beyond the Uvula, we see the Palatum Molle forms two Arches, in which lay the Tonsils, the two Arches are Muscles, One is called Palati Pharyngaeus, & the other is called by Albinus the Constrictor Isthmi Faucium. The Diaphragm is hollow towards the Abdomen, proportionally convex towards the Chest, divided by the Spine into a right & left cavity extending on each side considerably more backward than the Spine, it is fleshy except it's middle part called Centrum Tendinosum, where it is Tendinous, called also by the Ancients Centrum Nervosum. — The Heart lies upon the anterior part of the Centrum Tendinosum. This Large Muscle is attached before to the Sternum, laterally it is attached to the Margin

the

of the Chest from the seventh to the last Rib, not at the margin exactly, but about an Inch within it, for the Transversus is attached some little way up within the Chest along its margin, & backwards it is attached to the Vertebræ & to the Ligament stretched from the last Rib to the Lumbar Vertebræ; its middle part makes two Crura, which run down the fore part of the Spine having the Aorta between them; the Aorta lying rather on the left side, the right Crus is the largest, both are fixed in the Vertebræ Lumborum. The Diaphragm has two Perforations, & a Slit. Thro' the Slit the Aorta passes & as soon as it has got thro' it, sends off forwards the Cœliac Artery, then the Superior mesenteric, & then the Emulgents one on each side. The two Perforations are in the middle near the Spine, thro' the right which is round & in the Tendinous part passes the Vena Cava, thro' the left which is Elliptical, & in the fleshy part the Œsophagus passes. The Reason why the Vena Cava passes thro' the Tendinous part, & the Œsophagus thro' the fleshy part seems to be this, that the Tendon being fixt & immoveable while the Diaphragm acts, the stream of blood should not be impeded, and the Œsophagus by passing thro' the fleshy part will be contracted at every motion of the Diaphragm, so that the Stomach when pressed upon by it, cannot evacuate its contents upwards, the Canal being shut up. The Diaphragm in action is brought nearer to an even surface by being pulled lower at the same time that it draws up the Ribs & counteracts the Abdominal muscles in pressing on the Intestines, the two lateral parts are what principally move in action, the middle Tendinous part is fixed — What the Crura do we don't know for they come from the middle part which is not moved. In Expulsion of the Fæces of a Child the Diaphragm assists, but it has been disputed whether it acts in Vomiting; that it does act in Vomiting is plain; that when it acts & presses on the Stomach it shuts up the

Œsophagus

Œsophagus so as to oblige the Food to pass into the Guts; nevertheless we find the food passes upwards into the mouth, but this is while it is not in action; the Process of vomiting seems to be this, we first inspire strongly & shut the Glottis keeping the Air in, the Diaphragm is then relaxed, & the Abdominal Muscles press out the Contents of the Stomach into the lower part of the Œsophagus, we then throw the Air out suddenly and so clear the passage — In Inspiration the Diaphragm is active. In Expiration it is unactive. — The Quadratus Lumborum makes the hinder part of the Parietes of the Abdomen, & upon it ye Kidney lies. The Coccyx Muscle is properly only a part of the Levator Ani. Dr Douglas described it as a new Muscle, but many Anatomists before him had observed it & described it as a part of the Levator — On the Interior Edge of the great Psoas run the Iliac Vessels — Suppuration happens very commonly about the Loins, the Cellular Substance about the Kidney between the Quadratus & Peritoneum inflames & suppurates, Matter is formed & makes what is called a Psoas or Lumbar Abscess. In this Case the Matter scarce ever peirces thro' the Loins, but assisted by its own gravity it works down on the Iliacus Internus to the Groin following the course of that Muscle & the Psoas Magnus which unite & are inserted into the little Trochanter; at every pressure it works down the Inside of the Thigh & goes all the way to the inner Condyle of the Femur; if it is not evacuated at the Groin so as to make its way out or be let out, it has made such a large internal Sore as to produce Hectic Fever & Death, often making the bones carious & sometimes passing from one side to the other, If the Matter is formed we can generally guess at the Nature of the Disease from the preceding Symptoms of Inflammation & pain in the Loins; when the Patient in bed turns his foot outwards, it gives him pain in the

back

back, but if we turn it for him it does not, but on the contrary eases him, or if he bends his thigh forwards & turns his foot outwards, it gives him great pain in the back, but if we bend it for him & turn the foot outwards, it dont hurt him, but on the contrary makes him easier, by this we may be pretty certain that ye parts about & muscles on the forepart of ye Spine are in a State of Inflammation. When the Matter is formed & has passed down to the Groin, by putting our fingers to the Groin & ordering the Patient to cough, we may feel it fluctuate; and we are sure of the Case, we should make an Opening there to discharge it as soon as possible.

Dr Hunter and Professor Claghorn were consulted in the Case of a Man having Matter passing off by the Intestines; they thought it to be a Psoas abscess that had made its way into the Intestines & upon examining the body after Death, they found the Matter had made a passage from ye Loins into the Colon. Another Case of this abscess the Dr saw with Mr Middleton in a Man who lived in Cornhill; matter pointed in the Groin which Mr Middleton discharged by an Opening there. A Wax Candle was passed from the Groin up towards the Loins for its whole Length. He did well; the Success of this Case was owing undoubtedly to the Matter being discharged soon.

Sept 30th

Lecture 39th

Sometimes there is a little Psoas muscle running along with the great Psoas muscle, but its Tendon never goes farther than the Brim of the Pelvis, being always fixed to the os Pubis near the Ilium. Mr John Hunter is of Opinion that the Ligament between the Sacrum & the Ilium is the seat of the Inflammation that produces the Psoas Abscess. The Great Sciatic Nerve is out of the way of being hurt in an Injury of ye Joint; it often happens that from an Injury done to the Ligament the whole Limb becomes smaller & weaker; this Mr John Hunter thinks is owing to Sympathy, the whole Limb being affected by consent of parts in consequence of the Ligaments being hurt, & not owing to any Violence sustained by the Nerve particularly. The Fascia of the thigh is fixed to the Spine of the Ilium, it covers the fore & outer part of the Thigh down to the Knee very strongly, but on the Leg it is so intermixed with Cellular Membrane as to be indistinct. It has a Muscle fixed to it which arises from the spine of the Ilium called Membranous, said to tighten ye Fascia. Whenever any Matter is perceived under ye Fascia, it ought to be let out immediately by making a sufficient incision thro' it, for the Matter not being able of itself to make its way outwardly, will insinuate itself between ye Fascia & ye neighbouring Muscles & make great Havock. In the Sole of ye Foot is another Fascia from whence Muscles arise & it strengthens ye foot by being extended from ye Heel to ye Toe. From ye foot all along to the Groin runs ye Vena Saphaena. It now & then happens after bleeding there arises great inflammation & sometimes suppuration; This was supposed to be caused by a Tendon or Nerve being pricked, but as it most commonly happens that ye mischief follows bleeding in the Cephalic Vein, & as no principal Tendon or Nerve lies near it, that cannot be the case, & according to Hallet

wounds

The Cause of Mischief from Bleeding

Wounds of Tendons are by no means so consequential as generally imag-
-ined — Mr John Hunter thinks ye Inflammation is owing to ye exposure
of ye cavity of the Vein; he says that whenever an internal cavity is exposed,
nature sets up an inflammation to destroy it, that if the uniting inflam-
-mation arises, ye sides of the cavity are uniting by the first intention, but
if ye suppurative inflammation arises, then ye sides of the cavity suppurate,
and in both cases ye surrounding part partakes more or less of ye inflammation,
he supposes there is something in the inner surface of ye Vein as well as
in other internal cavities, that they cannot bear exposure, they are so
irritable that when ye Arm is inflamed after bleeding it is in consequence
of such exposure, the common appearances he says confirm ye Theory,
for very often the Arm is seen inflamed only in the course of the Veins, the
Skin having a line of discolouration reaching lengthwise along the Arm;
he has often Observed the Jugular Vein of an Horse to become inflamed after
bleeding, & in one instance particularly the Vein was inflamed as far as
within the Chest, & occasioned ye Death of ye Animal — Wherever
Suppuration happens from this cause, it commonly extends along the
wounded Vein — From a wound on ye foot the Vena Saphana was opened
& inflamed all the way up to the Groin, a string of Abscesses were formed
which required being laid open One after Another, so that he is of Opinion
that it is not the Wound of a Tendon or Nerve, that occasions these Alarming
Symptoms after Bleeding, but that it is the exposure of the inner
surface of the Vein

Cattle

Particular Muscles

Lecture 40th

The Anterior Position of the Scalenus Muscle passes between y^e Subcla-
-vian Artery and Vein, as they pass over the first Rib y^e Artery is outward
& between it & the Brachial nerves going down from the Arm to the
neck passes the posterior Portion. It is sufficient to know that there
are small Muscles between y^e Spinal and Transverse Processes of the
Vertebra without being minute about them. The Iliac Vessels pass
under Pouparts Ligament pretty exactly in the middle between the
Anterior projecting point of the Spine of the Ilium, and the most
projecting part of the Symphysis of the Ossa Pubis. The Artery on
the outside, and Vein on the inside lie upon the united Muscles of Psoas
magnus and Iliacus internus. The Actions of some Muscles are very
different according to the different situations of the parts to which they
are attached, thus the Glutaeus medius by reason of it's being attached
behind and before to the Os Ilium acts both as a Flexor and Extensor
of the Thigh; Note, all the fleshy fibres of a Muscle are nearly of the
same length; the Pyriformis muscle is divided into an upper & lower
Portion by the great Sciatic nerve perforating it. When we sit directly
upright the Sciatic nerve is not press'd upon, but when we sit inclining
to one Side, it is pressed on by the fleshy parts, & the Limb by that
mean is often numbed. The Obturator Internus is called a purse-
-like muscle, because it has a purse or Sacculus mucosus on it's
inside; where it ~~ov~~ passes over y^e Ischium, it receives two Muscular
portions from y^e Ischium called Gemini Muscles. The Triceps Femoris
is attached to the Anterior bony part of y^e Pelvis from y^e Os Pubis down
almost to the Tuberosity of y^e Ischium; it's anterior part acts as a
Flexor, it's posterior as an Extensor, & is a strong Adductor of the
Thigh. The great Vessels pass down from the Groin between the

Pectinaeus

Pectinaeus and Triceps, are covered by the Sartorius & run down the Thigh between the Triceps and Vastus Internus; all along to below the Middle of the Thigh the Vessels are before the Triceps, they then pass thro' the Tendon of the Triceps in a slanting direction, & get behind it to pass into the Poples or Ham & are there called Poplitaean; where they perforate the Tendon it is no wonder if a Surgeon meets with a great deal of difficulty in passing a Needle round the Artery in Amputation by reason of the toughness of the Tendon & the slanting direction of the Vessels thro' it, The Obturator Artery, Vein & Nerve go thro' the Obturator Hole, or Foramen Magnum Ischii at the superior part — The Tendons of ye Flexor Muscles of the Leg make the Ham-strings; the outer one is made by the Tendon of one Muscle, namely the Biceps, the inner one is made by the Tendons of four Muscles, viz the Sartorius (which is ye longest Muscle in the body) the Gracilis or Rectus Internus, the Semi-Tendinous, and the Semi-Membranous —

Lect. 4th

The Muscles of the Leg and Foot

Lecture 41st

The Leg may be said to have two Calves, the superficial made by ye Gastrocnemius muscle, & ye deeper seated formed by ye Soleus — In a rupture of ye Tendo Achillis ye heel must not only be placed upwards, but ye Leg must be bent to relax ye Gastrocnemius muscle — The Plantaris is very small; its fleshy part is very short, there is something very singular in ye Tendon of this muscle, it is very long & slender, & is not attached to ye Os Calcis like ye Tendo Achillis, but is lost in ye Fat & Cellular membrane before it reaches that bone; it is all the way distinct from the Tendo Achillis, so that ye Action directed by this Tendon seems to be distinct from that of ye Tendo Achillis, and its muscles, for it is so small that had it been only an Extensor of ye foot, the Tendo Achillis would have done as well without it as with it; The great Vessels passing from ye Poples run between the two Condyles of ye Femur, and the two heads of ye Gastrocnemius & Soleus on ye inside of ye Plantaris & go down to the back part of ye Leg between the muscles making ye Tendo Achillis & the deeper seated ones — The Little Toe has commonly no Tendon from the Extensor Digitorum Pedis Brevis — A Portion of flesh often goes from the Extensor Digitorum Pedis Longus to the metatarsal bone of ye little Toe, which is called by Winslow the little Peroneus — The Flexor Digitorum Pedis brevis has its Tendon perforated to admit ye Tendons of the Flexor Digitorum Longus to pass thro' them; this muscle is therefore called Perforatus, from its being more external than the Flexor Longus in ye Foot it is called Sublimis, & that is called Profundus; it is also called Flexor Secundi Internodii Digitorum Pedis — The Tendon of ye Flexor longus Digitorum Pedis in ye Sole of the foot is joined by an accessary piece of muscular flesh from ye Os Calcis called Caro Quadrata — From ye four Tendons of the Extensor Digitorum Pedis Longus in the Sole of ye foot are given off the four Lumbricales muscles so named because they are like Worms —

Lecture 2d

The Muscles of the Arm, Fore Arm &c

Lecture 42d

The Sacculi mucosi are full of a kind of Synovia; which is supposed to facilitate ye motion of a muscle in ye head of a bone. The Teres minor is seldom found to be a distinct muscle, but part of the Infra-Spinatus. The Annular Ligament at ye Wrist seems to be a continuation of ye Tendinous Fascia. The Tendon of ye long head of ye Biceps Flexor Cubiti passes thro' ye Joint & is washed by ye Synovia; except the Poplitaeus there is no other instance in ye body of this kind. Besides ye Tendon sent by this muscle to be attached to ye Radius there is a broad thin One, which goes from it to the Fascia of ye fore arm supposed to occasion inflammatory symptoms when pricked in bleeding, but Mr John Hunter's observations shew that the mischief depends upon ye cavity of ye Vein being ~~pricked~~ exposed. Dr Hunter thinks that ye muscle called Supinator Radii Longus is not a Supinator but a Flexor of ye Forearm only, for he says that in his Arm he can plainly feel this muscle swell in bending but in ye Supination of it he cant, & if ye hand be put prone, by pulling this muscle it is not laid Supine, but ye Arm is bent. The Flexors of ye Carpus all come from ye inner Condyle of the Humerus, & the Extensors of ye Carpus all come from ye outer Condyle. The Extensor Carpi Radialis is called also Bicornis because it has two Tendons or Horns at its lower end. The Flexors & Extensors of ye Carpus can act together; when ye Radial ones act together they draw ye hand inwards & sideways, when the Ulnar ones act they draw ye hand outwards & sideways. When ye hand is placed supinely, ye Flexors & Extensors appear to go obliquely from the Condyles to ye Carpus, but if it be placed in the middle state betw=een Pronation & Supination, they then appear to take a direct Course. The Palmaris longus furnishes ye Fascia in the Palm of the Hand. This muscle is sometimes wanting & then ye Fascia arises from ye Annular Ligament of ye Carpus. The Use of this Fascia is to guard ye Palm of the Hand.

Hand from Injury, particularly when we fall flat on it – The Fascia of the Arm & Thigh seem to prevent y^e Muscles from growing loose from y^e Cellular membrane by their frequent Action; they appear also to give strength to their action, for Tumblers who use great Muscular Action bind their Arms & Legs with Ribbands, & Garters, & Harvest People find great Relief by binding something round their body – The Swelling under y^e thumb on the inside of y^e hand is called Thenar from a Greek Word signifying striking as being the part we strike with; that opposite to it under the little finger is called Hypothenar – Brutes have no Limb endued with such a number of fine Motions as our Arm & Hand neither have they any Clavicle – The Capsular Ligament of y^e Shoulder Joint is very thin and the Joint is more formed for Motion than for Strength, but y^e Capsular Ligament is made stronger by being embraced by y^e Tendons of several Muscles, on the forepart tho' it is not embraced by any Tendon & consequently is weaker there, for this reason it is that in a luxation we find the Head of y^e Os Humeri almost always protruded under the neck of the Scapula into the hollow of y^e Axilla – It is most probable that the Capsular Ligament is torn in a Luxation & that when there is no possibility of making reduction, the head of y^e bone is received into the Laceration like a Button into a Button Hole – What seems to shew that it is lacerated is, by attending to the manner in which y^e bone passed out, & making Extension accordingly, we more certainly reduce it so.

We shall now introduce some Observations of M^r John Hunter's on simple and compound Fractures – A Simple Fracture commonly does well, & a Compound One but seldom, why this difference happens is by him accounted for from Inflammation; His Idea of Inflammation is this;

is this; Inflammation is always in consequence of irritation either from a Wound as from a cutting or other Instrument, from Constitution as the Gout, from some Specific as y^e Venereal Disease or from exposure, which is y^e most powerful & common cause in Fractures; from Exposure simply, & not from exposure to Air, because the Air in Emphysema does not stimulate y^e cavities it insinuates itself into; and he finds that in an Eagle there is a communication between the Lungs & Bones of the Wings, so that Air passes from y^e Lungs into them without doubt to give Levity to Flight; - When a Cavity is exposed it is irritated & nature sets up an Inflammation to shut up that cavity - If the sides of the exposed cavity are brought together they are united by what he calls the Adhesive inflammation, by the living principle of y^e blood, but if not brought together, then the suppurative inflammation takes place - M^r John Hunter is of opinion that y^e blood is Alive as Gobins and Harvey thought. If a Muscle be taken out of y^e body & pricked it will contract, its sensibility remaining so as to be susceptible of irritation this is what he calls the Life of a Muscle - If the blood gets between the divided parts, it unites them by it's living principle; We see that two pieces of wood brought together unite as in Grafting; and M^r John Hunter has cut y^e Testicles out of a Cock, & placed them in y^e belly of a Hen so as to grow there to y^e Liver, & by injecting y^e Vessels of y^e Liver he also injected the Testicles growing to it by its Vessels - He observes that Blood has y^e power of itself of becoming Vascular, for by examining a Stump about three Months after Amputation, he found that the blood which had coagulated at y^e end of y^e Artery had Vessels formed by itself, in itself, so that it is as easy to conceive the fluid

blood

blood to be alive as it is to conceive the solid body to be so. The Blood while it remains alive cannot be heated, for if a Man who has been sitting close to a very hot fire be bled, and another Man be bled who has been sitting in a very cold room, their blood will be of an equal degree of heat; nor can it be cooled, for he found that by putting a fish in Water and by endeavouring to cool the water with a Solution of Sal ammoniac so as to freeze it, all the Water was frozen except for a small space round the Fish, so that blood cannot be heated or cooled beyond a certain point by reason of its living principle being destroyed. The blood coagulates by being Stimulated and coagulates more readily as it is more alive, by being more susceptible of stimulus. Blood drawn from an healthy Man and thus stimulated by being exposed, coagulates sooner than blood drawn from an unhealthy Man at y^e same time. In Simple Fractures the Adhesive inflammation more commonly takes place; the Parts are united by y^e living principle of y^e blood, the blood forms a vascular texture between the divided parts, which at Length ossifies and unites the bones strongly, this being in considerable quantity is the reason why the Callus is always larger than y^e bone itself. And this Doctrine does not appear so extraordinary, for D^r Hunter shews a Patella, in which the very first sign of Ossification is a branching Artery. In Compound Fractures a cavity is made which is exposed by means of y^e Wound thro' y^e Skin; in this case the Blood parts with its living principle, nature raises the suppurative inflammation, and y^e parts do not unite as in the simple fracture owing to y^e exposure; and D^r Hunter shews

that

that a simple fracture may in its consequences become a compound one, the blood which should unite the parts loosing it's living principle, the same thing happening afterwards as in the Compound Fracture: he therefore advises us to cover the wound close in a compound fracture with a piece of sticking plaister to prevent exposure of the blood & deprivation of its living principle as a practice attended with great Success — In this manner Mr John Hunter accounts for there being so material a difference between ye event of a Simple & that of a compound fracture, the one almost always doing well, the other but seldom

The Muscles & Tendons of the Fingers

Lecture 43

Cross Bands or Indentations are thrown from one Tendon of ye common Extensor of the fingers to another, so that by moving one finger we move another. The Tendon of ye Extensor Proprius Indicis or Indicator passes under ye same annular Ligament with the common Extensor, & goes with it's Tendon to the first bone of ye fore finger & with it spreads a Fascia all over ye back of the finger as ye Tendons do in the fingers. As Extension of ye fingers requires but little force, the Extensor muscles are therefore small, but in Flexion great force is required to apply the fingers to resisting bodies, & therefore ye Flexors are strong. The edges of ye Perforatus at the Slit unite so as to enclose the Tendon of ye Perforans in a Sheath. The Tendons of the Flexors as they pass along the inside of the Bones of ye fingers are bound down by Annular Ligam=ents, three in each finger which contain Synovia for lubricating the Tendons; the first is a narrow annular Ligament stretched over them as they pass the first joint, another broader on ye first bone, & another on ye second bone. Except then the first, the joints are left free from annular Ligaments least motion should be impeded, & when the finger is bent ye ends of ye Annular Ligaments come close together upon the Joint. Thro' the two heads of ye Abductor Indicis in the Angle made by the end of the Metacarpal bone of ye forefinger and ye end of ye first bone of the thumb the Radial Artery runs, the Artery of the Pulse in the Wrists. As in the foot, the four Lumbricales are produced from ye Tendons of the Profundus or Perforans in the Palm of ye hand. The two first interossei externi join the Lumbricales & go with them to the side of the first and second finger next the thumb. The other Interosseus externus goes to ye side of ye ~~mid~~ ring finger next ye little finger along with Lumbricalis. The Interossei

Interni

The Muscles & Tendons of the Fingers

Interni go to ye sides of the finger, in each interosseous space there are two, primus & secundus. Interosseus Internus primus goes to that side of ye finger next the little finger; Secundus goes to the finger on ye side next the thumb. In Describing ye muscles all minute divis-=ions are avoided; it being only necessary to describe the same mass as One and not as many muscles

The Joints

In the Joint of ye Clavicle with the Sternum there is a moveable Cartilage as in the Joint of the Jaw; the Use of this Cartilage is to adapt itself to the Surface of ye bones in motion & make a variety of Socket. The Joint of ye Shoulder is most frequently dislocated of any other Joint; the Capsular Ligament independent of ye Tendons that cover it, is very thin and weak, thinnest & weakest before, so that the head of ye bone when dislocated commonly lies under ye Scapula. The Tendon of the long head of the Biceps passes thro' the Joint in a Channel made in the head of ye Os Humeri to receive it, it is washed by the Synovia; it is supposed that in some distortions of ye Joint this Tendon is forced out of its Channel and rides, but this cannot happen unless there are very great lacerations indeed. This Joint is an instance against ye opinion of that body which is found in many Joints being the Glandular Apparatus for seperating the Synovia, for this Joint is without it, & is nevertheless well supplied with Synovia. It is nothing but a piece of Fat lodged in a cavity which ye body had to spare, as is the marrow in ye bones; and ye Acetabulum Scapula & ye head of the Os Humeri being perfectly smooth without any cavity is the reason why this Joint contains no body of Fat. At the Elbow Joint the Capsular Ligament is very weak forwards & backwards

and backwards; in a cavity before there is a piece of fat, & in a cavity on y^e back part there is a piece of Fat also. In this Joint particularly there can be no Dislocation without Laceration of y^e Capsular Ligament, for on each side it is scarce a line's breadth reaching from one bone to the other. The Joint of y^e Wrist is made by three bones the Scaphoides, Lunare & a bit of y^e Cuneiform bone. these move entirely upon y^e Radius, y^e Ulna has no connection with y^e Joint all, it is articulated with the side of the Radius alone & rotates upon it in a Capsular Ligament distinct from that of the Joint of the Wrist. The Bones of the Carpus have considerable motion on each other. There is nothing particular in the Joints of the fingers, except the first of the Thumb where there are two Sesamoid bones connected to y^e second bone & are exactly what two little Patellæ would be. The Joints of y^e Vertebræ have already been spoken of in the description of y^e Spine; each bone has a Cartilaginous surface united round the sides by strong Ligamentous bones. The Joint between the Sacrum & Ilium is very ~~fixe~~, each bone has a Cartilaginous surface, which do not make a cavity between them, but have strong threads passing from y^e One & entering into y^e Substance of the Other. The Foramen Magnum Ischii is covered with a Ligament stretched all round it to give attachment to muscles like as a bone does; It is said that a Hernia of y^e bladder & Intestines may happen thro' this foramen, but if that be true (which however does not appear so) it is out of the Reach of Surgery. for if there should be a stricture the disease would lie very deep being covered by the Pectinæus, & if an incision is made thro' the Ligament the Obturator Artery will be wounded & the Hæmorrhage prove fatal. Under the United Tendons of the Psoas Magnus & Iliacus Internus where they play upon y^e bone there is a Sacculus Mucosus to allow y^e Muscles to slide easily to & fro.

The Joint

The Joints &c

The Joint of the Hip admits of a great deal of motion besides the Capsular Ligament there is in ye inner part of this a Ligament which connects ye head of the Femur to the bottom of ye Acetabulum, it is called ye suspensory Ligament, but improperly for it does not suspend the Thigh bone, as will appear to any One at the slightest View. It is so loose that when the Capsular Ligament is seperated all around, it will allow the head of the Femur to be drawn with Ease over ye Brim of the Acetabulum; towards ye Foramen Magnum Ischii there is a want of the bony brim, this is supplied by a Cartelaginous ring. Dr Hunter thinks the Reason why the Acetabulum is made of Cartilage rather than bone in this part is to give way to ye head of the Femur & adapt the Socket to it, & when not pressed on by the head, to be pressed on by the Muscles & be thus adapted to the bone. within ye Socket at ye bottom is a piece of fat. The Capsular Ligament is not fixed round the head of the Femur, but low down round the neck of ye Bone, so that it is loose to allow of free rotation — It appears pretty evident that ye head cannot possibly be dislocated without previous laceration of ye Capsular Ligament. — At the Knee Joint the Capsular Ligament is very loose on ye fore part to allow of bending — In collections of matter within ye Joint the Patella is raised up, & on each side below it there is as it were a Bag of fluid, which is a common appearance in a white swelling — Between the Ligament of ye Patella & ye Tibia there is a Sacculus Mucosus in which there is often a collection of fluid not communicating with ye Joint. The great Strength of this Joint is ye Cross Ligaments between ye two Condyles, these being placed behind prevent the Leg from going farther than to a straight line with ye Thigh. The two Condyles of ye

Femur

The Joints &c

Femur do not play on the Cartilaginous surface of ye Tibia, but on two moveable flat Semi-lunar Cartilages – The Use of these Cartilages is to make variable Sockets in figure & situation for the Condyles, within this Joint is a considerable quantity of fat & by cutting thro' the Ligament of the Patella near that bone, ye knife dont immediately enter the cavity of the Joint, but goes into a Bed of Fat – In the Joint between the Leg & the foot there is nothing but what is common to other Ginglymi Joints – The Capsular Ligaments is loose before & behind, but on the sides it is very tight and here must be ruptured before Dislocation can happen – In the other Joints of ye Foot there is nothing material, only that there are two Sesamoid bones connected to the first bone of ye great Toe, which makes a Groove for ye Flexor Tendon to lye in, & as in the Thumb they serve the Office of Patella – The Tendon of the Peroneus longus passes thro' a sheath on the outside of ye Foot, in it's passage to the underside of ye foot this sheath serves to bind down ye Tendon & prevent its slipping, it contains a small quan=tity of Synovia to make the Tendon slip easy – The other Tendons of ye foot are tied down by Annular Ligaments to keep them in their proper place —

General Figure, Situation & Connection of the Viscera

Lecture 41.st

To understand ye Viscera better it is necessary to give a general View of their Figure Situation & Connection. — The Thorax & abdomen are divided by the thin muscular partition ye Diaphragm; their cavities are both perfectly filled by the Viscera, so that except in an unnatural state, there is no cavity not filled up. — In considering what Viscus is affected, when the patient shews us ye place of his pain, we must remember that ye Viscera ascend & descend, or go to one side in ye different positions of the body being higher in laying along, lower in sitting or standing, & to one side when we lean to one side; & to know whether ye Lungs are wounded or any other Viscus, when a Man is run thro' ye body with a sword, we must enquire whether it was at ye time of Inspiration or Expiration, for in these actions they will be higher or lower as the Diaphragm is elevated or Depressed & we must enquire whether ye Stomach was empty or full at the time, for when it is full it will be much lower in the abdomen than when empty, & in pregnant Women ye gravid Uterus rising up must necessarily alter the situation of all ye other Viscera, or the increase or diminution of any Viscus will vary the situation, so that an enlarged Liver may extend down to the Os Ilium. — The Thorax is entirely surrounded by Bone. It is divided into ye Anterior part or Sternum, the two lateral parts & ye Posterior part; This division is all that is necessary in ye Thorax, making an allowance for the rising & falling of ye Ribs In Inspiration & Expiration; But in the abdomen it is different, there is a very large space without any bone at all. — Anatomists have therefore divided it in so many Regions for ye same reason that Astronomers have divided the Heavens into Regions; — The Abdomen reaches from the Diaphragm down to the

Pelvis

Pelvis & is there divided; Conceive a line to be drawn across the body about one half way down to the Margin of ye Chest, & midway between this & navel imagine another line to be drawn across ye body, all the interior part of ye division above the last imaginary line is called the Epigastric Region, and the two lateral parts are called ye right & left Hypocondrium ~ The Epigastric Region is a triangular Space bounded by the edge of ye Ribs, the highest part of it is called Scrobiculus Cordis or pit of ye Stomach; this division anteriorly & for some little way laterally at its upper part is thorax, the posterior, superior, and inferior part is all abdomen ~ Suppose a line drawn across at an equal distance below ye navel with the other, all this space included between these two imaginary lines is entirely Abdominal, & is called the Umbelical Region, & its lateral parts we chuse to call ye Flanks. ~ the next division is of all ye Abdomen that is below ye last line; it is a triangular space made by the imaginary above, & the sloping bony brim of ye Pelvis below, & called ye Hypogastric Region, the very lowest part of it is called the Region of ye Pubes ~ The upper end of ye Os Sacrum is immediately opposite to this last line; ~ This Region comprehends ye whole cavity of ye Pelvis ~ We shall first consider the Thorax in a general way ~ The Pleura adheres on its outside to the Ribs and Intercostal Muscles by Cellular Membrane; on its outside it is closely in contact with the Lungs ~ It has been said, that there is always a quantity of Air in ye cavity of the Thorax, but it is very plain that there is no Air, for the pleura every where touches the surface of the Lungs so as to have no space unfill'd by them, & in letting out water from ye Chest no Bubbles arise ~ If we immerse a body under water, & open the Chest, no Bubbles will be seen to arise thro' the water

water as it fills the cavity; upon opening the right & left side of the thorax, it appears plainly that they make two cavities, one on each side not communicating, for between them is ye Mediastinum made by the doubling of the Pleura & is very narrow — By cutting thro' the Breast bone between the last bone of ye Sternum, & ye Xiphoid Cartilage, where ye Cartilage of ye last true Rib is inserted, we cut upon ye lowest part of the Mediastinum without going into the cavity of ye Abdomen. The Pleura is a reflected membrane, that part of it attached to ye Sternum is called the Mediastinum, from the Sternum conceive it running upwards & backwards over ye Pericardium covering ye outer Surface of ye Lungs, the upper side of the Diaphragm, the Spine and the Ribs, & uniting at the back part of ye Thorax; this doubling of the Pleura at the back of ye Thorax Dr Hunter calls ye posterior Mediastinum — The old Anatomists not understanding ye nature of ye reflected Membranes have talked of ye cavity of ye Mediastinum, of trepanning the Sternum to let out fluid from ye cavity, but they had not ye least foundation for saying so, for the double Pleura is so closely united as to appear but one membrane — The Pleura gives a smooth surface to ye containing & contained parts of ye Thorax; it is one & ye same membrane reflected over them, so that the Water of ye Hydrops Pectoris can touch nothing but Pleura — Behind the Lungs the Pleura of ye right & left side meeting make a compleat partition between ye right & left cavity preventing all communication with each other; this partition is thicker here than at the Sternum; within it the Aorta Descendens Vena Azygos, & Oesophagus run; the Aorta to ye left of ye Oesophagus, & on ye right side of ye Oesophagus runs ye Vena Azygos, all these lie in Cellular membrane between ye reflected Pleura — The Pericardium is tied

The Pleura and Lungs

is tied to the Sternum by y^e Mediastinum, the Lungs are connected on their inside to y^e Pericardium & to y^e Spine backward, by y^e posterior Mediastinum. The middle part of y^e Thoracic Contents are so bound down by y^e Sternum, Diaphragm & Spine, that they have but little or no motion. The Lungs naturally play upon y^e Pleura (or pleura upon pleura for y^e Lungs are coverd with it) but in disease, in inflammation for Instance, there is often a gluey substance thrown out between them which gradually grows vascular & y^e Vessels generally run directly from one to the other, the Lungs & Pleura are thus united by a vascular substance similar to Cellular membrane, which by y^e motion of y^e Lungs & Pleura is drawn out to a small length like a Ligament. These Adhesions are very often numerous. The Lung (for one speaking of it on one side we shall call it Lung, & in speaking of both sides in general we shall call them Lungs) lies naturally loose in each cavity, except at y^e middle & inside where it is connected to the pericardium, this part is called the Root of y^e Lung & is the Center of Ramification; A branch of y^e Trachea Arteria, y^e great pulmonary artery, & a pair of pulmonary Veins enter it here, every where else it is unconnected touching however y^e contained parts, the Pericardium, Diaphragm, Ribs, Spine, Sternum & Mediastinum. The Diaphragm is convex above toward y^e Thorax, below towards y^e Abdomen it is concave, in Expiration it moves up & drives y^e Air out of y^e Lungs, in Inspiration it moves down, enlarges the Cavity of y^e Chest & y^e Air distends the Lungs. Water collected in y^e Pleura makes y^e Dropsy of the Chest, it is a common disease, but we can seldom or ever say absolutely that y^e disease is present, because y^e same Symptoms

may arise

may arise from other causes. By reason of ye Mediastinum there may be a collection of fluid on one side of ye Chest & not on the other; when there is a fluid, it cannot be felt by ye fluctuation as in ye abdomen, because ye Pleura is every where & always tight between ye Ribs. Water cannot get out of ye Chest into ye Cellular Membrane of ye Lungs, because the Pleura every where covers ye containing & contained parts. The Mediastinum may serve ye purpose of a Ligament to ye Pericardium to keep ye heart in it's place, & to make a double cavity in the Thorax. The advantage of a double cavity is evident, for when one cavity is perforated, it happens, that when the Patient is attempting to breath, the Lung of that side collapses in consequence of ye Air rushing thro' ye wound, & destroying ye Vacuum within, but on ye other side Respiration is carried on uninterruptedly. The Heart in it's pericardium lies upon ye Diaphragm immediately under ye Sternum & Mediastinum. From accumulation of Fat about the Heart Respiration is often performed with difficulty, especially if exercise be used; A young Lady very corpulent whose Month of lying in was up; upon any quick motion had such a difficulty of Respiration come on frequently as to endanger Suffocation, & in one of these fits she died. Mr Middleton opened her body & found ye Heart surrounded with a lump of Fat: the fat in ye Abdomen had pushed ye Diaphragm up so as to push ye Heart & Lungs into ye very upper part of ye Chest, and thus by disturbing ye circulation was ye cause of her death. Similar to this case was that of ye late Lord Pembroke, who died after hastily stooping to reach ye Poker to stir ye fire; his Death too was occasioned by fat

by fat — The Lungs in ye fattest person have never any fat about them — The Heart lies very nearly in ye middle of ye body, immediately behind ye second bone of ye Sternum (very little more to ye left than the right side) that is from the connection of ye second Rib down to the seventh enclosed in the Pericardium, which appears of greater bulk upwards where it is fastened to ye great Vessels, it touches ye Pericardium every where so that there is no empty space between them — The Pericardium always contains a little Water — Internally it is a smooth polished Membrane which is reflected over ye heart, so that the Liquor Pericardii touches only this Membrane & cannot escape out of it, the liquor is naturally colourless as may be seen by opening a body just dead, but after ye body has for some time ye liquor becomes bloody, by ye blood transuding to it — the Liquor found in most bodies is only partly coagulated by heat, ye greatest part of it remains fluid — all ye Anterior part of the heart is loose, so is ye lower part which makes a flat surface for ye Diaphragm, but behind it is fixed by ye great Vessels to ye Pericardium, it lies rather transversely across the body its flat side resting on ye Diaphragm from ye Basis to ye Apex, the apex points towards the left side; ye internal Membrane of the Pericardium is reflected entirely over ye Heart, which has given rise to a Conundrum or Question, Whether does ye heart lie within or without the Pericardium — The Pericardium is connected anteriorly to the Mediastinum, below to the Diaphragm, behind & above to the great Vessels — The Use of ye Pericardium is to enclose ye Heart, but this is not the only Use it serves, for ye Pleura would have done this as well, Nature has given it to fix ye Heart in ye body, so that it might keep it steady in its Motion, & prevent ye Vessels being twisted by its getting out of

out of its place, for it is fixed to the Mediastinum before, below & laterally to the Diaphragm & behind to the Spine. When ye Diaphragm moves down in deep Inspiration, it pulls the Pericardium, but so as not sensibly to affect ye Vessels passing thro' it from ye heart, yet if we make a straining effort to Inspiration when ye body is upright, the pulse in ye left Wrist ceases to be felt, ye left subclavian Artery goes off in a straighter course from ye Aorta than the others, & when ye Pericardium is pulled down by the Diaphragm, this Artery is stretched & tightened so as to give no sensible pulsation along ye Arm. It has been said, that Hedge-hog has no Pericardium, but Dr Hunter has dissected ye Animal & finds that it has. Sometimes ye Pericardium is found to have contracted adhesions to ye Heart, now & then so universally that some bodies have been suspected to have wanted a pericardium, but it is never wanting tho' it is sometimes firmly & entirely adhering to ye Heart, the reason why this Adhesion is not so commonly met with as that between ye Lungs & Pleura is because of the continual Motion of ye Heart, & because inflammation here will soon prove fatal. So much for the Thorax & its Contents in a general way. The Peritoneum covers ye contained & containing parts of ye Abdomen. Three Ligaments are ascribed to ye Abdomen which appear by risings of ye Peritoneum; the upper Umbilical Ligament, which was a Vein in the Foetus, coming in at the navel & running up to the Liver at the great fissure before; from ye navel downwards one on each side, which were ye Umbilical Arteries going to ye internal Iliac Arteries, & between these sometimes appears what was the Urachus from ye bladder in ye Foetus. We must make a little allowance for ye Viscera being somewhat higher when the body is supine. Under ye Scrobiculum Cordis in ye right Hypocondrium &

Epigastric

The Peritoneum &c

Epigastric Region lies ẏ Liver, the stomach is covered by it except a little of its lower part — The Epiploon depends from ẏ lower part of ẏ stomach chiefly, and as it goes down ẏ flexure of the Colon adheres to ẏ inside; its lower edge is down in the cavity of ẏ Pelvis, it covers all ẏ Intestines before — The small intestines are fixed to the Loins by the Mesentery — The Colon is fixed to the Loins by what is called Mesocolon — The Rectum is fixed to the Os Sacrum & Os Coccygis by Cellular Membrane, and is commonly surrounded in ẏ Pelvis by a great quantity of fat — The small intestines possess ẏ greatest part of ẏ general cavity of the Abdomen, & fill the Pelvis — When the Rectum or lower end of ẏ Colon is full of hard Fæces, as it sometimes is, we can feel them in a thin body lying on its back, by pressing with ẏ hand above the Os Pubis, towards the lower part of ẏ Spine & os Sacrum, the Peritoneum encloses the abdominal Viscera twice, once loosely by lining ẏ abdominal cavity & once closely by being reflected over ẏ Viscera & making their external Coat, so that the water collected in ẏ Abdomen that makes the Ascites, touches nothing but Peritoneum and cannot get out —

L. A. 5th

The Thorax, Neck &c

Lecture 45

We shall go again over the Thorax making some Alteration from what was said before — The two Pleuræ that make ye Mediastinum at the upper part fly off & make a Triangular space between them by their dividing from one another, In this space the Thymus Gland in ye Foetus is lodged before ye great Vessels in ye upper part of ye Pericardium partly in ye Neck, this Gland wastes in the Adult, & the space contains only Cellular Membrane — The Vena Cava Superior is within, but the Vena Cava Inferior is without it, they go the right Auricle of ye Heart, the Aorta lies to the left of them & goes to the left Ventricle, ye Pulmonary Artery lies to the left of the Aorta & backwards, goes to ye right Ventricle; this bunch of great Vessels is what lies between the two Lobes of the Lungs at ye Superior part of ye pericardium partly within & partly without. In the Angle before, made by the head & neck lies ye Basis of the Os Hyoides, below it is ye Pomum Adami, below this the Cricoid Cartilage is placed, & from the Cricoid Cartilage lies the Thyroid or Bronchial Gland a little way down the Trachea Arteria, ~~Anteriorly~~ where the ~~great~~ Gland lies upon the Trachea Arteria it is small, it runs backwards on each side lying upwards & downwards & is larger & broader & lies directly upon the Carotid Artery, Jugular Vein, & Par Vagum, these lies upon ye Vertebra, for a Foetus has this Gland continued to the Thymus, so that they both seem to be but One; sometimes it is enlarged & makes the Guttur Tumidum, this Gland is particularly large in Women — when we perform Bronchotomy (which is commonly done by opening the Trachea under the Cricoid Cartilage between it & the first ring) in a short neck particularly in Women, & when the Gland is large, we necessarily

necessarily cut thro' the Gland & divide the Veins, so that ye Hæmorrhage is very troublesome, it is exceedingly Vascular & is called a Gland, but whether or no it is a Glandular body we are not certain. Aneurisms were often supposed to happen in ye Neck to Women from their Violent strai=ning in Childbirth, they were often observed to have a Tumour with pulsation of the forepart of ye Neck, & these Cases were adjudged to be Aneurisms of ye Carotid Artery; but this was a Mistake, for the Gland is very often enlarged especially in Young Women & makes a Tumour in ye Neck & being hardened it takes a strong stroke from the Artery, so as to be mistaken for an Aneurism. To distinguish this disease from an Aneurism proceed in this manner, press upon ye Tumor backwards & you will feel ye pulsation, then place ye fingers on ye side of ye Tumor & raise it, & if it is not an Aneurism there will be no pulsation felt while it is so raised up, & if ye Tumor is not from an Aneurism but from an enlargement of this Gland only, it will go up with a Jerk in Deglutition, because in swallowing ye Gland goes up with the Trachea Arteria & Cartilages of ye Larynx. Dr Hunter of all ye Aneurisms he has ever seen never saw one in the Neck. The Trachea Arteria runs down from ye Thyroid Cartilage to the Thorax thus; first it runs behind the left Subclavian Vein & ye common trunk of ye right sub=clavian & Carotid Artery, lower down it is behind ye Aorta & Vena Cava superior, at ye Basis of ye Heart it divides into two Branches, that which goes to the right Lobe of ye Lungs passes behind the Vena Cava Superior, that which goes to ye left Lobe passes under ye curvature of ye Aorta. The Œsophagus goes directly behind ye Trachea Arteria, immediately upon & close to ye Vertebræ & goes within what we call the Posterior

Mediastinum

Mediastinum all y way down on y middle forepart of y Spine, having y Vena Azygos on its right side, that gives Veins between all the Ribs & comes from y Vena Cava superior; on its left side lies y Aorta Descendens. The Œsophagus lies close to y Spine between it & y Pericardium under the Heart, then gets a little to the left side of y body to pass thro' the fissure in the Diaphragm. Dr Hunter has an Œsophagus in which a Half Crown Piece is sticking just behind the Heart. The Diaphragm is attached to the inner Margin of the Chest about an Inch above it to make room for y attachment of y Transversalis Muscle of y Abdomen, & y fibres of the two are in a Manner connected. We come now to the abdominal Viscera none of which are attached to y forepart of the abdomen, except y Liver, which is only by a Ligament or Fold of the Peritoneum from y Diaphragm going round what was y Umbilical Vein in the Fœtus to the Diaphragm again, called y Falciform Ligament. The Liver lies immediately under y Diaphragm & has a convex Surface adapted to that of the Diaphragm & abdominal Muscles; it is divided by an interior notch into a right & left Lobe, y right which is y largest fills up the Whole Epigastric Region & Hypocondrium of y right side, the left is the smallest & possesses part of the Epigastric Region; the underside of y Liver is concave, y concave surface of y right Lobe is not perfectly smooth; it lies upon y Kidney & has y Gall-bladder & Duodenum under & behind it; y concave surface of y other Lobe is smooth & lies upon y Stomach & y little Epiploon of Winslow; upwards & backwards y Liver is firmly connected to the Diaphragm. The Stomach lies in y left Hypocondrium, its larger end called Cardia begins from y Œsophagus underneath y Diaphragm, then goes

goes downwards making a Turn, crosses ye projection of ye Spine &
terminates in ye Duodenum at ye smaller end called Pylorus. The Spleen
lies under ye Stomach's greater extremity upon ye Diaphragm, these two
Viscera possess ye same space on ye left side, as the Liver does on the right —
As we call that which connects ye small Intestines to ye Loins Mesentery
& that which connects ye Colon to ye Loins Mesocolon, it is better to call that thin
membrane running to the Liver from ye upper part of the stomach by
ye name of Mesogastrium, instead of ye little Epiploon as Winslow calls it.
The Mesogastrium covers ye Lobulus Spigelii, so that it may be seen thro'
this Membrane behind; the Gall-ducts go down by it to ye Duodenum;
near ye bunch of Vessels that enter ye Liver it makes a cavity with only one
opening in it by a natural hole in this place & ye cavity extends over the
Stomach; the place where this bunch enters is called ye Porta or Gates of
ye Liver by ye Greeks & it was said, the Priest who examined ye Entrails of
ye Victim at ye Ceremony for telling future Events, observed ye Liver in this
place particularly. The Epiploon is fixed to ye Stomach, from whence
it turns up to the Duodenum, which goes down to the right Kidney
thro' ye Mesocolon to ye Root of ye Mesentery. to this part ye Duodenum
may be said to be going down, then ye gut turns up by going under the
root of ye Mesentery over ye projection of the Spine; the Duodenum is
nowhere loose or floating, but is everywhere bound down, as soon as
it becomes loose it is called Jejunum, ye Mesentery begins here. The
small Intestines are three, ye Duodenum, Jejunum & Ileum. The
general bulk of ye Jejunum is in ye cavity of ye Abdomen; as the Gut
goes on it takes ye name of Ileum at no determinate point however,
the general bulk of ye Ileum possesses ye cavity of the Pelvis, the
Gut grows larger at ye upper edge of ye right Os Ileum, here the
large intestines begin, ye first of which is ye Colon. The Colon runs
upon ye right side over ye Kidney & Psoas Muscle & some part of the
Liver

The Mesentery and Intestines

Liver, then turns from ye right Hypocondrium & runs across ye body to the left, as it goes across it passes under ye great curvature of ye stomach, then it goes downwards & backwards to ye lower end of ye Spine to form the Rectum, the Colon almost surrounding ye small Intestines & ye Rectum lying in ye Pelvis — We see in what universal a manner ye warmth of a Glyster will be diffus'd over ye small Intestines, for ye whole Colon may be filled with a Glister injected up ye Rectum — The Mesentery is a fold of ye Peritoneum from ye Loins going over ye small Intestines & to the Loins again, at the Colon it is very broad, at the two terminations of this Gut thro' it, it is narrow, it is called here Mesocolon & is plainly a continuation of ye Peritoneum & of ye Mesentery, between ye Fold the Vessels run to ye Intestines — The Epiploon is connected before to ye great Curvature of ye Stomach & runs upon ye left side to the Spleen between it & ye Colon; from its connection with ye stomach we see ye reason why in a strangulated Hernia ye patient complains greatly of his Stomach, it is caused by a little bit of ye Epiploon getting down into ye Hernial Sack dragging down ye stomach — In this case when we operate, to set ye part free, it is a general Rule with Surgeons to spread out ye Epiploon to see that we do not cut off or tye any Intestine with it when we cut off, or make a ligature upon it, for ye danger from wounding ye Colon which is ye Intestine generally protruded in a Hernia would be very great. The Epiploon is a bag of ye Peritoneum in a Foetus, but in an Adult or soon after ye Child is born, ye cavity is filled up by ye sides uniting together, & each side of this bag is a doubling of ye Peritoneum, so that ye Epiploon is made originally of four folds of ye Peritoneum

The Liver &c &c

Lecture 46

We shall go over ye abdomen again & begin with ye Liver; what is called the left Ligament of ye Liver is nothing more than ye left extremity of the general connection of this Viscus to the Diaphragm by ye Peritoneum; what is called ye right Ligament is nothing more than ye right extremity of the general connection to ye Diaphragm, on this side it is farther back & less conspicuous than on the other. On ye right side ye Liver goes as far back as ye Abdomen goes, & hangs pretty low down, on ye left side it dont go so far back nor hang so low, & has ye Stomach & Spleen connected with it behind. The Vena Cava Inferior lies on ye right side of ye Spine just below ye Diaphragm & turns thro' a notch in ye Liver. The great Vessels of ye Liver go from ye Root of ye Mesentery at ye Loins obliquely upwards and pass over ye Lobulus Spigelii; upon ye Lobulus Spigelii is seen ye great bunch of Vessels which go into ye Porta of ye Liver; it is made of the Hepatic Artery, ye Vena Portarum Hepatica & ye Hepatic duct that makes ye Ductus Communis Choledochus. The Vena Cava Inferior lies behind the Lobulus Spigelii, & immediately below it sends off ye emulgent Veins; The Lobulus Spigelii lies immediately before ye right Crus Diaphragmatis.

The Oesophagus, as soon as it gets thro' ye Slit in ye Diaphragm before the Spine, turns about to ye left to be continued into the large end of the Stomach. The Spleen is joined to ye posterior part of ye great extremity of ye Stomach & gives Vessels to it. Next the stomach it has a concave surface adapted to ye convexity of that Viscus, where it lies against the Diaphragm it's surface is convex to be adapted to ye concavity of that Partition. It's two ends lie upwards & downwards obliquely, it's lower end resting on ye kidney, the upper end touching the Spine; it's posterior surface is connected to ye Spine & kidney of ye left side

The Duodenum

side by Cellular membrane — Before ye projection of ye Spine in ye Loins just in ye Angle between ye Mesocolon & Mesentery; ye great Mesenteric Vessels go down, ye artery on ye left, & ye vein on ye right, they branch in the Mesentery to the same Intestine & go up to ye Colon by branching in ye Mesocolon — These branches run in ye Cellular membrane that connects ye doubling of ye Peritoneum & spread over ye Intestines, along with them ye Nerves go & ye Lymphatic Vessels which pass thro' Lymphatic Glands in their Course from ye Gut — The Duodenum begins at ye right extremity of ye Stomach at the Pylorus; the commencement of ye One & ye end of ye other is known by a Stricture, it first arises up then turns downwards, then backwards, passes over ye kidney of ye right side & goes thro' ye Mesocolon; here we lose sight of it, but by turning up ye Mesocolon we gain sight of it again & see it crossing the Spine to ye left side, ye Vena Cava lies behind it where it goes thro' the Mesocolon, it crosses ye spine behind ye root of ye Mesentery & its Vessels, then emerges, becomes loose, & acquires a Mesentery, & then ye Gut takes the name of Jejunum, so that ye Duodenum takes a circular course from ye Stomach to ye Spine, & to ye concave part of it the right end of the Pancreas is fixed — There are two reasons why ye Duodenum is fixed & has no Mesentery, first because ye other Intestines that have a Mesentery are loose, & fall down by their weight, & if ye Duodenum then had had a Mesentary it would have been loose & fallen down as ye others, ye consequence of which would have been, that ye Stomach would have been continually disorderd from being pulled down with it, secondly because if it had had a Mesentery so as to have fallen down when ye body was erect, the Gall-Ducts would have been stretched & ye flowing of ye bile into the intestines

intestines would of course every now & then have been prevented :. To avoid these accidents it is that y^e Duodenum is firmly bound to the parts by which it runs, & is not connected to y^e Loins as y^e other Intestines are.

Winslow describes a great & little Pancreas, but they are only two Lobes of one & y^e same Gland. The Pancreas lies across y^e Spine behind the Stomach, the greatest part of it is on y^e left side making what Winslow calls y^e great Pancreas, w^{ch} y^e great Lobe, it's end touches y^e Spleen & y^e great Splenetic Vein runs along it's lower part to that Viscus, y^e Splenetic Artery behind it's upper part; it is a flat Gland, one flat surface lying towards y^e back, y^e other towards y^e Stomach, it's left extremity lies upwards & backwards & lies very far back in y^e Abdomen, it's right extremity lies forwards and downwards & does not go so far back as y^e other; where it lies across y^e Spine it is very narrow to allow room for y^e Mesenteric Vessels, when it has got across y^e Mesenteric Vein it grows larger & sends down a process which fills up y^e concavity of y^e Duodenum that otherwise would be vacant, this is y^e little Pancreas of Winslow. There is one Duct to the whole Gland, which opens into the Duodenum.

In y^e Mesentery & Mesocolon are Veins bringing back blood from y^e Guts, these are every where called Venæ Portarum, because they carry y^e blood to y^e Porta & branching into y^e Liver distribute y^e blood to all parts of it. This is a singularity in y^e general circulation for instead of carrying it's blood to y^e Vena Cava as others do, the Vena Portarum carries it to y^e Liver; it resembles a Tree having it's Roots on the Mesocolon, y^e branches make one Trunk which passes under the Pancreas, where it receives y^e Vena Splenica & then enters y^e Porta. The Duct of y^e Liver receives y^e Duct of the Gall-bladder into it, passes down behind the Duodenum and unites with y^e Pancreatic duct.

The Abdominal Viscera

duct; which commonly enter by one common Orifice into ye Duod-
-enum close to the Pancreas at the lower part of a longitudinal
ridge on the inside of the gut – having now done with ye general
description of ye Viscera in Situ, we next come to the description of
each particular Viscus as it appears in dissection. As ye Abdominal
Viscera sooner putrefy than ye Thoracic, we shall begin with them
first, & because that putrefaction soon spoils ye whole, we shall
first only speak of them Anatomically, & when ye whole of them are
gone thro', we shall speak of them Phisiologically – the greatest of
ye Viscera of ye Abdomen is ye Alimentary Tube, ye others are only
appendages to it – It begins at the Pharynx, from this the Œsophagus
is continued down, which we shall begin with, then it becomes Stomach,
from this ye Instestines arise, three small ones, call'd Duodenum Jejunum
& Ileum, & three large ones, the Cœcum, Colon & Rectum which ends
at ye Anus. This Tube is fixed in some parts, in others it is loose &
has a smooth external surface, it has only two proper Coats, for
ye Peritoneal Coat is not general – The outer coat is muscular made
of external longitudinal & internal circular fibres, ye inner coat is
a shaggy membrane called Tunica Villosa from ye Villi that compose
its shaggy appearance; it is of a very close texture & serves to
prevent exudation as ye internal membrane of ye Blood Vessels does
in ye living body – Anatomists have described another coat between
these two, by some of them called ye Cellular, by others ye nervous Coat
but it is nothing but Cellular membrane connecting the two together
As soon as ye Œsophagus gets thro' ye Diaphragm, it dilates a
little & is continued into ye Stomach. It does not lie in much

Cellular

The Alimentary Tube

Cellular membrane as it is fixed by the Parts themselves through which it passes & is but small. This Muscular Coat is very strong, ye external longitudinal fibres are stronger than ye internal circular ones; withinside ye Muscular is ye Villous Coat, it is so loosely connected with ye Muscular Coat that it may be pinched up, & a piece of it cut off without engaging that, it is made rough & shaggy by ye Villi which are short & exceedingly Vascular. In ye Æsophagus there is a Cuticle but Dr Hunter never could find any thing like this appearance in the Stomach by steeping &c. That it is cuticle is very evident, for every thing else but this is Vascular & may be injected it is perfectly inorganic. As ye Cuticle on ye external parts is sometimes thickened & diseased, we may suppose that this may sometimes be so too. & Dr Hunter has a considerable piece of this Cuticle thickened, which was vomited up, it tore without any fibrous appearances & appeared in every respect like ye External Cuticle

The Stomach

Lecture 47th

The Stomach begins at y^e lower end of y^e Œsophagus, which is dilated gradually; where y^e Stomach begins it is called Cardia, & by some tho' improperly y^e superior or left orifice; it ends at y^e Duodenum at what is called y^e Pylorus, by some as improperly as y^e other, y^e inferior or right orifice; & resembles a Bag-pipe; its upper concave part between y^e two orifices is called the little Curvature. The Peritoneum is stretched over each side of it & makes its external covering, & this membrane from y^e two sides meeting at y^e great curvature forms y^e Epiploon. Its muscular coat is strongest at the Cardia & little curvature, mani=festly a continuation of y^e longitudinal fibres of y^e Œsophagus, for where it is narrowest y^e muscular Coat is thickest and vice versa. The muscular Coat is composed externally of longitudinal fibres & internally of circular ones, but both these are blended together. The inner or Villous Coat is loosely connected to the muscular by Cellular membrane. When a Stomach is opened that has been disten=ded, this Coat is found smooth in proportion to the distention, but if opened without being distended, then it will always be found thrown into Rugæ, because this Coat ~~can~~ cannot contract & therefore when y^e muscular Coat is contracted it throws this into Rugæ, which appear to be circular, longitudinal or both according to y^e different contraction of y^e different muscular fibres; y^e Rugæ are not permanent but made entirely of y^e loose Villous Coat, & if this is made even by distention of y^e Stomach, yet it appears rough & shaggy by means of y^e Villi interspersed throughout. We are not sure that there are any Glands in y^e inner coat of y^e Stomach as we are in y^e Intestines especially y^e large ones. The Vessels come to the Stomach at the

little

little & great Curvature, & anastamose with each other. The Arteries & Veins run every where together. at the Cardia there is nothing material; at y^e Pylorus there is a doubling of y^e inner Coat that makes a ring somewhat Valvular determining precisely y^e end of y^e Stomach & beginning of the Intestines, it projects a little way into the Duodenum, & is received by it like as the Os Uteri is formed of y^e inner membrane of y^e Uterus & is received by y^e Vagina. It is not a perfect Valve for y^e Bile often comes up in Vomiting; y^e place where y^e Stomach ends & y^e Duodenum begins is easily known by a Stricture, above which the Stomach is thick & immediately below it y^e Gut is thin. The Small Intestines are three, the Duodenum, Jejunum & Ileum. We shall first describe a small Intestine generally & afterwards mention the peculiarities of y^e Three. It is thrown into the Circular figure by being attached to the mesentery, which is immediately at it's Concave part; it's external Covering is a Continuation of Peritonaeum, except where the mesentery is attatched to it. this Intestine has not any Fat upon it even in the Fattest bodies. It's muscular Coat is composed of external longitudinal & internal circular fibres connected to the inner Coat by Cellular membrane, y^e inner Coat is Villous, & loose so as to form Rugae which are permanent, called Valvulae Conniventes, but as Ruysch Observes, they are not Valves, as they allow passage both ways, these are permanent; those in the Stomach are only Occasional. their Evident Use is to enlarge the internal surface of y^e Intestine for the purpose of Secretion & Absorption, so that y^e inner Coat is as long as if the Gut was twice or thrice as long as it is, the inner Coat is shaggy and

secreting

exceeding Vascular, frequently there is an appearance in the Inner Membrane of y^e Intestine, which we take to be Glandular, & they are Glands sometimes diseased, thickened, Indurated & even Ulcerated all up & down y^e Intestine. In Some bodies they shall appear very numerous, in Others you shall hardly see One. The Vessells come from y^e Mesentery (while in the Mesentery they Anastamose freely) but there is no Appearance of Anastamosing in y^e Intestine. The Arteries & Veins run together & besides these there are Lacteals & Lymphatics which are best considered seperately. The Peculiarities of the small Intestines are these, y^e Duodenum has nothing peculiar except that it has no Mesentery, where y^e Mesentery begins on y^e Intestine y^e Jejunum begins. The Jejunum differs from the Ileum in that it has Valvulæ Conniventes, which y^e Other has not, & of course it is thicker & has more blood carried to it than y^e Ileum because of y^e greater quantity of inner Coat, which is very Vascular. There is no mark by which to tell where y^e Jejunum ends or Ileum begins. For y^e Valvulæ Conniventes don't disapp:ear suddenly, but diminish insensibly. Winslow attempted to determine this point by measurement, saying that of y^e length between y^e Duodenum & Cæcum, y^e one was two fifths, & y^e other three fifths, but however this may do in y^e dead body, it never can be applied to y^e Living. The Cæcum, Colon & Rectum form y^e large portion of y^e Intestinal Canal. It's beginning is largest of all, then it decreases as it goes along to y^e size of y^e Ileum, but when it gets down to & in y^e Pelvis it grows large again at y^e Cæcum is a Valve so that nothing can pass from y^e large to y^e small Intestines. The Muscular Coat of y^e Colon makes 3 longitudinal bands which pucker up y^e Intestine into several Concavities on y^e inside called y^e Cells of y^e Colon. The Colon makes y^e greatest part of y^e large Intestines & differ from y^e Small Ones in that

in that it has little fatty bodies upon it, its inner Coat is Villous, but the Villi are very short & few. The Place where ye Cæcum ends & ye Colon begins is not distinctly known, for ye small Intestine goes into the Large Intestine not in ye middle but on one side as ye membranous part of ye Urethra does into the bulbous, as if one side of ye Gut was dilated & it is this large part, that is generally understood to be ye Cæcum; Behind it is ye appendix Cæci Vermiformis, it is a small Tube opening into the Gut near ye Valves, & it's Extremity terminates in a blind point. The Colon seems as tho' it were a Continuation of it, for ye muscular bands all come from it. Some have said that this Appendix is what was meant by ye Cæcum, that it is ye true Cæcum, but this cannot be, for from ye Earliest Ages of Anatomy, the Intestines have been divided into the Small & the large, & ye Cæcum has always been reckoned as one of ye large, but this Appendix is ye very smallest part of them. The Valve of the Colon, call'd ye Valve of Tulpius, is like that of ye Duodenum, a produc:tion of ye inner Membrane received into ye Cæcum, going however much farther into ye Cæcum, than ye other does into ye Duodenum; it's sides by coming into Contact with each other, act as a Valve. The Rectum has two bands of Muscular Fibres, one before, ye other behind, these are very strong & by their Action constringe ye Gut to discharge ye Fæces all at once. Having considered ye Alimentary Tube Anatomically, we next come to consider its Appendages, ye Spleen, Pancreas & Liver, reserving ye Physiology of both till after we have gone thro' ye Female Organs of Generation

The Spleen & Pancreas

Lecture 48th

The Spleen has an Artery from the Celiac, & a Vein from the Vena Portarum; It is said that the blood does not coagulate in the Splenic Vein, but it does as much as in any Other; besides the External Peritoneal Coat, it has a Capsular Covering of it's own, independent of the Peritoneum, & is not to be separated from the Spleen without tearing up along with it little pieces of the Parenchyma, or fleshy Substance, which is very soft, and pappy; the opposite sides of the Capsular Coat are united by little Ligamentous Chords, that make a fine Net-Work all thro' the body of the Viscus — Ruysch supposed that all it's Substance was Vascular, that every the smallest piece of Parenchyma was a contexture of Minute Arteries — How it's Veins are disposed has not been tho' aught to be known, the general Opinion is that they terminate in Cells, this however; but is not proved — The Vessels are so tender that with the gentlest handling the substance is soon reduced to a fluid form like blood, it has a great Number of Lymphatic Vessels. It's Use is not Known —

The Pancreas like the Spleen soon grows tender & flabby; between it's great & little Lobe, it is small to allow the Vena Portarum to pass under it; now & then it has a little portion hanging to it besides the two Lobes — It has no One Center of Ramification but recieves Vessels at every part — the Duct passes along the Middle of the narrow part of it to the Duodenum & commonly Opens into it along with the Ductus Communis Choledochus by one common Orifice, sometimes by a separate Orifice, & then always divides into two branches, & sends One to Unite with the Gall Duct, & the Other into the Duodenum by itself; for the most part however it unites with the Ductus Communis Cholidochus just as it is piercing the Intestines & opens by One Common Orifice — — The Lobulus Spigelii lies just against the side of the Spine; — the Superior & back part of the Liver is united to the Centrum Tendinosum of the Diaphragm; on the right, & left side bet:ween the Lobulus Spigelii, & body of the Liver is a transverse fissure —

The Porta

The Porta, where the principal Vessels enter at the Anterior part, is another fissure; where the remains of the Umbilical Vein is first which runs thro' part of the Liver to the Vena Portarum, & a little of the Canal is sometimes found in an adult. — In a fissure on the left side of the Lobulus Spigelii, is the remains of the Ductus Venosus going from the Vena Portarum to the Vena Cava, & in a fissure on the right side of the Lobulus Spigelii the Vena Cava passes. — There is a dent in the Concave Surface of the great Lobe for the Gall Bladder to lie in — the Peritoneal Coat is easily seperated from the Substance of the Liver, & leaves the Surface tolerably smooth — The Vessels of the Liver are, first the hepatic Artery, which enters it near the Porta & brings blood to it. The mesenteric Veins, & Splenic join to make the Trunk of the Vena Portarum, which divides into a right, & left branch, that go to the right & left Lobe; this Vein is the same in the Foetus, but has a Vein coming into it from the navel, & from it goes to the left Vena Cava Hepatica — The Ductus Communis Choledochus from the Duodenum divides into two branches, one the Hepatic Duct that goes to the Liver, the other the Cystic which goes to the Gall bladder: at the Porta then there enters the Hepatic Artery, the Vena Portarum, the Ductus Hepaticus, the nerves in Plexuses, and the Lymphatic vessels, & this One Center of Ramification — There is another Center of Ramification from all parts of the Liver to the Vena Cava Inferior where it passes thro' the fissure just under the Diaphragm. The Blood brought to the Liver is carried back by Veins, which open principally by two branches into the Vena Cava (to wit, the Vena Cava Hepatica dextra, et sinistra) just as it is Emerging from the Diaphragm there are some other smaller branches, & sometimes a considerable One from the Lobulus Spigelii, but the two first are the principal — Dr Glysson, and Anatomists since him have taken up an opinion of there being a muscular Sheath inclosing the Trunks of the Vessels at the Porta, and giving off Covering to the branches, called Capsula Glyssonica, but it is nothing more than

Cellular

The Liver

Cellular membrane made harder by Plexuses of Nerves that run into it.
The Parenchyma of the Liver was supposed to be a spongy mass, into which the blood was effused, lying between the Arteries & the Veins. Ruysch thought the whole was Vascular, but Albinus who had Ruysch's preparations, & Observations, and injected as well as himself, is of Opinion that it is not wholly Vascular. The Gall Bladder may be considered as an appendix to the Liver to receive the bile; the Cystic Duct which comes from it is twisted up first upon the body of the Gall bladder, & then turns down, it lies in a Concavity connected with the Liver, & the Peritonaeum is stretch'd over the part of it which don't adhere to the Liver, it has the outer Cover of the Liver continued over it; We conclude that it must have muscular fibres forming a muscular Coat, for Mr John Hunter Observes that in live Animals the bladder is always contracted over the quantity of bile it contains, be it little, or much, and their Action the same as do the Intestines.
The inner membrane call'd Tunica Villosa is rather honey-combed than shaggy, & its Use is to Exude in the living body.

The Female Organs of Generation

Lecture 49th

The Genital parts of Women are liable to many Varieties, & different Diseases, in examining it, it is much better to do it by the hand Alone, but if it should be necessary to have Ocular Examination, it ought to be done with One Glance of the Eye as it were, for it saves a Woman a great Deal, to be as Expeditious, and delicate as possible — A Surgeon therefore should make himself perfect master of the Appearance of the Parts, both to the Finger & Eye, that he may be able to conceive every thing of this kind with facility — If a Woman is lean, the Os Pubis always projects greatly, if she is fat, then the Bone is always covered with a thick Cushion of fat; this rising on the Pubis is called Mons Veneris, it has no particular boundaries, below this as we go downwards are the Labia then the Perineum, then the Anus, and then what Dr Hunter calls the posterior Perineum — The Labia; when the Legs & thighs are close to One Another, are both together; they Arise from the Mons Veneris, above & before, and their Extremities are insensibly lost towards the Anus — They are covered with the Common Integuments & Hair as well as the Mons Veneris, but where they touch One Another, they are without hair, they are a very little more than the Doubling of the Skin, & arise insensibly from the Mons Veneris dividing into a kind of fissure; the passage leading to the Vagina is not exactly in the middle Length, but it is under the Symphysis of the Ossa Pubis, which reaches two thirds down behind the Labia — Throwing the Labia aside, in the living body all that Surface which appears is red, & to a rough Eye seems like raw flesh; it is covered with an exceeding fine membrane — In this Situation of the parts upwards, and from the Symphysis of the Ossa Pubis is seen a projecting Ridge coming out very small, & increasing as it goes down, this is called the Clitoris; it has rather a rounded Eye called Glans Clitoridis, which is covered by a Prepuce made by

the Skin

the Skin of the Labia; as it passes over from the One to the Other, — The Same kind of mucus is secreted about the Glans Clitoridis, as about the Glans Penis in Men, & the more fluid part of it evaporating, it adheres to the Glans & Prepuce in an inspissated Cheesy form as in Men, & has likewise that offensive Smell. The Clitoris lies supported by the bone, & dont hang so low down as the under part of the Ossa Pubis, it has no perforation similar to that in Men —

From the Glans Clitoridis on each side go down the Nymphæ, or Labia Interna, which touch One Another, & are of a red Colour, they may be considered as a Fold, or Doubling of the External Labia; at their upper end they are fixed to the Clitoris, & of course are always close together there, but they recede wide at the bottom when drawn asunder; Each Nymphæ at its upper part divides into two folds, the Anterior fold makes the Preputium Clitoridis on One side, & the posterior, or inner One ties the Glans down underneath, analogous to the Frænum Penis — In a Maid, the greatest part of the Nymphæ are situated on the Outside of the Symphysis of the Ossa Pubis, — In those who have born Children they hang somewhat lower; when these parts are kept covered from the Air by the Labia, & from friction, they are of a fresh red Colour, but when the Nymphæ project without the Labia, or otherwise remain uncovered, they lose their red Colour, & become of the Colour of the Integuments on the Outside — The Clitoris has sometimes been so large, that with some people, it has been a matter of doubt, whether the Person ought to be considered as a Man, or Woman, but it never hangs detached, nor is its Glans perforated as the Penis is, so that we need not hesitate a moment to say, of what Gender the Party is — Sometimes the Nymphæ are very large, & long & give the Woman a great Deal of Uneasiness of Mind, but it is of no Consequence at all, — By turning aside the Labia & Nymphæ we gain sight of the Passage leading to the Vagina & Uterus, — It don't lead in perpendicularly from the Labia, but slants first downwards, & then the

Vagina

Vagina rises upwards; all this beginning of the passage, that is so much of it as is without the place where the Hymen is attached, is smooth all round, & in this differs from the Vagina; it's depth in a contracted state may be half an inch, or an Inch in one that is distended — The Common passage has no particular name; we shall call it Vestibulum — The Vagina is rugous, it begins at the place where the Hymen is attached, & reaches as far as the Uterus — this passage divides into two, one leads to the Meatus Urinarius, & the Other & lower to the Uterus: Close to the under part of the Symphysis of the Ossa Pubis is a small granulated rough Eminence of flesh, & on the forepart of it is the Meatus Urinarius, or end of the Urethra easily to be distinguished by the finger without seeing it; it is placed as high up as possible so as not to have gone thro' the bone; by feeling for this little Eminence the Catheter may be introduced into the bladder with Ease, without hurting the Woman so far as not to make use of the Eye, unless the parts are altered in Situation, & appearance by inflammation — As soon as the passage becomes rugous, the remains of the Hymen appear surrounding the beginning of the Vagina, like so many little eminences, call'd Carunculæ Myrtiformes, very apparent in Women that have had Children: the passage goes down behind upon the inside of the Perineum, & then mounts up forwards: on account of this bending passage the Child's head in birth comes down from the Uterus, & presses out the Perineum by lodging on the Inside of it, the parts hereabout are all put on the stretch, the Anus is always seen to open, & the parts within are pressed against it: the great End of Midwifery is to support these parts, & prevent thereby the Child's head from lacerating them at the time of a strong pain, for when once a laceration begins, it runs a great way, it is like tearing a piece of Cloth or paper — The Vulva & Anus are sometimes torn into one, & the Woman is

rendered

rendered miserable ever after, the Sphincter Ani being torn, the divided parts never unite, & the Stools are continually coming away involuntarily, we should therefore support the parts, with our hand against the pressure of the Child's head & beg that the Woman will by all means not bear down strongly, but forbear her throws as much as she can, and by so doing, & waiting with patience the Head gradually makes it's Way rightly, & the Child is born without lacerating the Mother — Dr Hunter once had a patient, that while he was supporting the fore part of the Perinaeum, expecting the Child would make it's Way by degrees naturally, the head forced itself thro' the Perineum, between his hand & the anus by making a transverse Laceration there; the Child was born thro' this Laceration without passing thro' the Vulva, the Woman soon recovered, & had no inconvenience remaining after it, for the Sphincter was not torn, only the Perineum suffered, the Rectum was not injured, & the Woman is still alive & well, It has been proposed in such Cases to sew up the lacerated parts with a view to Unite them, but it never is of any Service as the lacerated Skin always inflames, & suppurates, for the parts are in the state of a bruise from the great stretch they have undergone during the time the Child's head pressed against them — at the same depth from the surface of the body as the meatus Urinarius, there is a doubling of the Skin all round the passage call'd the Hymen — In many Young Subjects it is found, & always in a Fœtus, or new born Child — Dr Hunter believes it is always as regularly formed, as a mouth or nose — it makes the passage very narrow, it is of a Crescent form, the broad part behind, & the horns before, as the Female grows, it naturally grows less, & less, & sometimes gradually disappears in a great measure of itself, & does not exist, as commonly supposed to be torn in the first Coition; for it is frequently wasted away in Young Girls, who have not lost their Virginity, so that it's being destroy'd, is no proof of a Woman's having had a Child, or forfeited her Virginity —

Virginity; but the Entrance of the Vagina is always very narrow before the first Coition; whether a Woman has had a Child, or not, is generally known by the Skin of the belly, for if she has had a Child, it will remain rugous, & seamed from the distension it suffered during Pregnancy, & if she never had a Child, it will be smooth & even; this mark tho' is fallacious, for Dr Hunter shew'd the body of a Woman, the Skin of whose belly was rugous & seamed, and yet she never could have had a Child, for there was a perfect Hymen within the Vaginal passage which would not suffer the introduction of a finger. The same Appearance of the Skin may be occasioned by Dropsy, and yet it was plain that the Woman did not die of that disease, & it is highly probable she never had it; thus far has been described the Common Appearance of the External parts. The Anus is surrounded by a Sphincter muscle as in the Male, & the Levator Ani, & Transversus Perinei are just the same. The Sphincter Vaginæ is but one Circular muscle leading up to the Crura Clitoridis, the Erector Clitoridis of each side are the same in their Situation as the Erectores Penis in the Male. It has been disputed whether or not the Vagina has any Sphincter, but Dr Hunter says, he knows it to be wanting. The Clitoris is made up of two Crura consisting of Corpora Cavernosa like the Penis in Males, but without any Corpus Spongiosum Urethræ; besides this there is an additional Cover by the Sphincter Vaginæ called the Plexus Retiformis, which is filled with blood, at the same time that the Clitoris is, it is a flat spongy body lying round the beginning of the Vagina, a Network of an inconceivable number of Veins. The Skin on the Inside of the Labia, & Nymphæ is all full of little bodies supposed to be the Glandular Organs that secrete the mucus of those parts, which mucus is Analogous in every respect to that secreted by the Glands about the Genitals of the Male. By opening the Abdomen, & taking out the Intestines, we have the following Appearance in the Pelvis of the Female; the Bladder is of the same Shape as in the Male, & its broadest part is lowest,

it lies

The Female Organs of Generation

It lies close behind the Os Pubis, & when not distended is considerably below the upper Edge of that bone; the Rectum is backwards close upon the Os Sacrum, and Os Coccygis: these two do not differ in their Situation from what they are in the male; between them lies the Uterus low down in the Cavity of the Pelvis, & covered with the Peritoneum, but so loosely connected as to admit of being drawn upwardly above the Symphysis of the Ossa Pubis; it appears like a protuberance of the Peritoneum. The two broad Ligaments of the Uterus are the Peritoneum going off from the Fundus on each Side, & are what tied the Uterus to the Side of the Pelvis; they make a compleat Partition that divides the bottom of the Pelvis, into an Anterior, & posterior Cavity; in the Anterior the bladder rises, in the posterior the Rectum descends. The round Ligaments are a bundle or Plexus of Vessels that go from the Fundus Uteri before the former, & in an Impregnated Uterus first go downwards, then rise upward in the Pelvis, & go thro' the Abdominal muscle, as the Spermatic Vessels do in Men & are lost in the Mons Veneris & Labia;

In the Gravid Uterus they pass from above downwards, to the Opening in the muscle, for then the Fundus Uteri is rais'd with the Peritoneum above the Os Pubis; the End of each broad Ligament divides into two Folds, the Anterior contains the Fallopian Tube, which has a small Orifice at its Extremity surrounded with jagged Flesh in a foliated form called the Morsus Diaboli & Fimbriae; the posterior fold has the Ovarium lying upon it. When the Hymen is not pervious, it is a disease, or Lusus Naturae. Dr Hunter supposes Diana is drawn with an Half Moon on her forehead as a token of her virginity.

Lect. 50th

The Female Organs of Generation

Lecture 50th

The Bladder is situated in the Female nearly as in the Male, but where the Prostrate Gland lies in the Male, instead thereof there is the Vagina; it is connected to the Vagina, the Symphysis of the Ossa Pubis, & surrounding parts by Cellular Membrane. — The Rectum makes the same kind of turns down the Os Sacrum to the Anus as in the Male, & is supported by the Levator Ani, & Os Coccygis at the Anus. The Peritoneum is reflected over the Bladder, Uterus, & Rectum. In passing from the bladder to the Uterus it goes down between them so as to make a Cavity between them, & it passes from the Uterus to the Rectum, it goes down still lower & makes a posterior Cavity like a bag between them; from the bottom of these two Cavities the Peritoneum rises up to cover the Uterus, which is loose, & varies it's position a little in the different attitudes of the body. The Peritoneum in the Anterior Cavity does not go so low down as the Os Tincæ & consequently covers no part of the Vagina; in the posterior Cavity it goes below the Os Tincæ & covers a pretty considerable part of the upper end of the Vagina. In a Dropsy of the Abdomen the Water fills the posterior Cavity as well as other parts, & by it's gravity assisted by the gravity of the Intestines, & their pressure in Respiration, it forces down the Peritoneum, there is then a bag of Water between the Uterus, & Rectum, which is gradually pushed on & sometimes directs it's way quite down thro' the Cellular Membrane, between the Vagina, & the Rectum, & points at the Perinæum which is made so thin that a small puncture with a Lancet, would discharge the Water, & by the finger in the Rectum, the bag of Water is easily felt before it; every where behind the Bladder & before the Rectum the Vagina lies, it follows the Curve of the Intestine, & os Sacrum, from the Vestibulum it goes first backwards, then forwards, & upwards. The Vagina at the upper part, as much of it as is not covered by the Peritoneum, lies in close contact with the Rectum, but betw:een the Anus & Vestibulum there is a pretty considerable thickness of muscular flesh —

flesh; if the laceration in birth dont go thro' this thick part, they retain their Faeces; if it does, they do not retain them; for in this thick part, the Sphincter Ani muscle is situated — By the finger in the Vagina the Os Uteri is felt with ease, & the state of the Rectum as to Faeces, & of the bladder as to Urine, is easily to be judged of by this means — The Disease call'd Procidentia Uteri is frequently happening — the Uterus being pressed upon has a tendency to be protruded thro' the Vagina: the first appearance of it is, the forepart of the Vagina bulges outwards on account of the obliquity of the passage — The Uterus does not pass immediately down the Vagina, but forwards on the fore part of it behind the Meatus Urinarius; as it advances the pressure shifts itself more backwards, & when it comes to the Vestibulum, the Os Uteri appears at the lower part of the Vagina; endeavouring to push out at the Vulva, or at its first appearance the posterior part of the Vagina may be press'd out near the Perineum — this is the Common Progress of a bearing down — the Spermatic Vessels come from the great Vessels in the Loins, & go as far as the Pelvis, as in the Male, but instead of going out of the Groin, they stop in the Pelvis, & run in between the two folds of the extremity of the broad Ligament on each side, & are expanded partly on the Ovarium, partly on the Fallopian Tubes, & partly along the broad Ligament to the Fundus Uteri — Each of the great Iliac Arteries sends down two branches — That which was largest in the Foetus, & went up from the Pelvis to the Navel, degenerates into a Ligament in the Adult, the other branch goes down on the side of the Pelvis to the Bladder, Uterus, & Vagina, called the Hypogastric Vessel — Deep seated in the Vagina on the side of the Perineum are situated Cowper's Glands, generally very small, but in some women are as large as a Nutmeg: their Ducts slant upwards, & open just before the Carunculae Myrtiformes, or the Hymen in Young Girls, & from them a Slimy fluid may be pressed out: By slitting up

the Vagina

The Female Organs of Generation

the Vagina, we see that it is most rugous just within the Carunculæ Myrtifor:mes, & as it approaches the Uterus it becomes smooth; the Anterior & poste:rior parts are more rugous, than the two sides. The Orifice of the Uterus is a Slit from side to side with the Appearance of a ring round it, & projects a little way into the Vagina. In All common bearings down the Uterus is not inverted, it is only the Vagina that suffers Inversion, unless indeed just after Delivery the Uterus itself is now & then inverted & falls thro' the Os Tincæ; the Substance of the Vagina itself is very thin, covered all within by a continuation of the Integuments, & is all Villous, & has likewise a Cuticle as the Œsophagus has, which may be peel'd off after the Vagina has been long steep'd in Water, its sub:stance appears to be rather Ligamentous than Muscular, & its Rugæ are all transverse; it is very thin & in hard Labours is frequently torn thro'. The Uterus was always till Eustachius dissected it, represented resembling a flatten'd Pear, but in this they consider'd it with the Ligaments & Peritoneum; We divide it into the upper & larger part, the Fundus, & the lower & smaller part the Cervix; The Vagina is fixed to the Cervix & is reflected round to the Orifice so as to make that ring which surrounds the Orifice. Till Pregnancy is pretty far advanced, there is no part of the Fœtus contained in the Cervix, but all of it in the Fundus. The Substance of the Cervix is hard like a Gristle & without Vessels in proportion to the Fundus which is much softer and exceeding Vascular. As the Uterus is nearly of the same thickness throughout the internal Cavity is of the same Shape as the external Surface, that is to say, nearly triangular with one posterior & two lateral Angles. The inner Surface of the Cervix is full of Rugæ with a Longitudinal Ridge in the middle of the fore part. The Rugæ go off from the Ridge on each side upwards & outwards, like the fibres of a feather; there is but little difference in the Size of Uteri, In some Women, especially in Old Age, the Cavity of the Cervix is Obliterated, so that

so that there is no passage from the Uterus to the Vagina. The Orifice in general is large enough to admit the End of the finger half the length of the nail, & so that the Rugous Surface may be distinguished; in the upper part the Cavity is conglated on each side, & is as if it were subdivided into two horns, in this it comes nearest to the Descriptions given of it by Anatomists, who copied commonly from Quadrupeds. In the Angle of each horn, is an Orifice thro' which a Bristle may be easily pass'd, by this Orifice the Fallopian Tube opens into the Uterus. When the Uterus is impregnated a quantity of gelat:inous fluid is thrown out from the sides of the Cervix, & connects them together, so that all Communication between the Uterus & Vagina is cut off. The Vessels of the Uterus are very numerous. The Spermatic & Hypogastric Vessels Anastamose first under the Peritoneum, & then enter the Substance as the mesenteric Vessels do before they go upon the Intestine. The Sub:stance of the Uterus has fibres which have a Contractile power, but their action is slow. This we conclude to be true from the Uterus contracting upon the hand when introduced to take away the Placenta, for at first it shall go in readily but after a little while it can only be introduced with difficulty. The Appendages to the Uterus are first the Ligaments, The round Ligaments have been supposed to be muscles that in Coition draw down the Uterus so as to adapt it to receive it to Receive the Semen, & their Situation would seem to favour this Opinion, but they appear to consist of nothing but Vessels, & their Use not at all made out. The Others are the Ovaria & the Fallopian Tubes. The Ovarium was call'd by the Ancients the Female Testicle till the time of De Graaf, Nuck & Steno, & was supposed to secrete Semen to mix with the Male Semen. They are much of the Size & Colour of the male Testicle. In Young Women it is smooth, in old Ones it takes an

unequal

unequal chopped Surface, one end is connected to the Uterus by the broad Ligament, the other is connected to the Orifice of the Fallopian Tube at the Morsus Diaboli, the Spermatic Vessels enter it on that side which is connected to the broad Ligament, & shoot thro' it; That side which is near the broad Ligament has many Considerable Vessels, but that part of the Substance which is at some distance from it, is not much Vascular, & in Women that have not conceived there are several little Hydatids scatter'd up & down the Substance, the Corpus Luteum is not found in an Ovarium of a Woman that has conceived —

The Fallopian Tube is connected to the Fundus Uteri, it increases in bulk, & becomes convoluted like an Intestine as it goes on to terminate at the Morsus Diaboli — the Orifice is in the middle of the Morsus Diaboli like the hole in the middle of a Pink Flower; their inner Surface is Rugous — the Bottom of the Bladder rests upon the Vagina, and sometimes in Delivery it happens that the Vagina and Bladder are lacerated, and a Communication is opened between them, which always continues to be a depending drain for the Urine — If there is a rough Stone in the Bladder at birth the Bladder being press'd between the Child's head, and the Stone may be so much bruised as to bring on Inflammation, and Suppuration, & the Patient who for 6, or 8 Days was thought recovering, shall have her Urine gush out of a sudden from the Separation of the part in consequence of the Injury done her in Labour, and afterwards can never retain her Water — If a Stone is sticking in the Urethra it will easily be felt by the finger in in the Vagina — As the Urine only flows thro' the Urethra, now & then

it may

it may be cut, and will heal again; but if the Bladder is wounded from the Vagina, the Wound never heals, because the Urine is continually running thro' it — All that posterior part of the Bladder that lies between the Ureters and Urethra lies upon the Vagina — The Urethra is very short, little more than an Inch, or an Inch and an half in length, it is straight and distractile, so that a Stone will often pass thro' it of considerable bulk — It is every where upon the Vagina

At the time of Puberty, the Uterus and Breasts of Women increase vastly more in proportion than all the other parts of the body, and at the time of Utero-Gestation still more

The Lymphatics

Lecture 51st

The Absorbing System was not Known about 140 years ago, neither was the Circulation of the Blood. We have already considered it in a general View, & shall now take a View of some of the particular Lymphatics. It was thought that the Mesenteric Vessels absorbed the Chyle from the Intestines; & the Disappearance of the Water of a Dropsy was accounted for by saying that the Veins absorbed it. Erasistratus seems to have been the first that noticed the Manner in which the Chyle is conveyed from the Intestines, for he saw the Lacteals upon the Mesentery of Kids. Eustachius discovered the Thoracic Duct in a Mare, and Asellius clearly made out the Lacteals. Rudbeck seems to be the first Discoverer of the Lymphatics. The Reasons why they were not discovered Sooner, were probably these, first too great respect for received Opinions; secondly they had no Injection, thirdly the Vessels in many parts are exceeding small, fourthly accidental discouragements, & lastly dead bodies could be but seldom obtained for Dissection, and the Use of these Small Vessels did not appear to be considerable. The Manner of finding a Lymphatic Vessel is in the first place by puncturing a Lymphatic Gland & blowing into it, which will inflate the Vessels: secondly, by Putrefaction as Malpighi & others used to find them, but they did not know that it was Air entering them from the putrifying Cellular Membrane, that rendered them visible. Anatomists have said that they are to be found by blowing into the Arteries, & thus inflating them, but in this Case the Air don't pass immediately from the Arteries into the Lymphatics, but first ruptures the Arteries, & gets into the Cellular Membrane & from thence into the Lymphatics by Extravasation & they have said that by blowing into the Excretory Ducts, as into the Ureters, the Lymphatics will be inflated, but this likewise happens from previous Extravasation

extravasation — Blowing into the Cavities whence they arise, as into the Intestines, will distend them, & render them conspicuous, & they generally will be found to run along with the Mesenteric Vessels — When a Vessel is found, if it is a Lymphatic it may be known from an Artery, or a Vein by the great Number of Valves, & from the great thinness of its Coat, & from running upon Surfaces where no Sensible Artery, or Vein runs, as upon the external Surface of the Liver; besides, those Vessels do not ramify as the other Vessels do, but make Networks with Each Other, & till they come to a common Trunk they have no Valves — Nuck denied that they had any Valves, & call'd those little bodies within them pieces of fat Only, for he observed that they might be injected both ways; but it is very plain that they have Valves, & tho' they dont catch in the dead body, it most probable that they have something depending on Life which makes them catch in the living body, Another peculiarity is, that the Lymphatics are often long solitary Tubes running the whole length of the Leg & thigh without branching, & they often grow Varicose. — The Substance of the Lymphatics is probably muscular, tho' we cannot demonstrate any thing muscular in them — Some have said that the Valves are little muscles to propel the Lymph forwards, others, that they are to strengthen the Sides of the Tube, which Opinion Professor Monro says, is frivolous, because a Sphincter on the Outside would have answerd the purpose, better than this on the Inside — Their Use is undoubtedly to prevent the retrograde Motion of the Lymph — Suenhoek supposed that every Lymphatic had its Origin in a Gland — Nuck supposed them to arise from Follicles — Brianeil & Bartholini were the first who imagined them to rise from the Interstices of fibres — Dr Hunter has demonstrated that they arise from every surface of the body both internal & external; they generally run between an Artery & Vein towards the heart, except those of the Liver; an other peculiarity is, that they are always running thro' Glands; they all seem to

terminate

terminate finally in the Thoracic Duct, or the Receptaculum Chyli; seldom in the Veins in any Animal, tho' Mr Hewson has found, that in fishes many of them terminate immediately in the Veins besides what go to the Thoracic Duct, but in the human body they mostly terminate in the Receptaculum Chyli. Dr Hunter thinks there is nothing particular in this part of the Duct deserving this name; sometimes there is a little dilatation of the lower End of the Duct, which is called so. In France a Gentleman has lately taken up an Opinion that the Receptaculum Chyli is not one Trunk, but consists of several branches; for this Opinion however there is not the least foundation. The Thoracic Duct begins at the first, or lower Vertebra Lumborum, it runs up the side of the Spine, passes under the right Crus Diaphragmatis, goes up to the Chest between the Aorta & Vena Azygos, passes under the right Subclavian, & Jugular Veins, & then makes a turn downwards, & terminates by a single Orifice in the left Subclavian Vein. It's Office is to throw the Lymph & Chyle into the Mass of Blood. Boerhave supposed that the Chyle consisted of Oil, mucilage, & water, because of these he could make a white Compound somewhat similar to Chyle. The Lymph is commonly transparent & wateryThe Chyle is commonly white, & when exposed to Air, puts on the same Appearance, as the Blood does, that is, it seperates into a Coagulum & Serum. Dr Hunter thinks the Stomach is much Concerned in making the Blood. Dr Fordyce is of Opinion, that the first joint of a Lymphatic, or Lacteal fills itself, & then contracts, & forces the fluid into the second Joint, & that afterwards the motion of the Arteries &c continually propell it forwards. It seems probable that the Chyle is propelled by the Contraction of the Intestines squeezing it forwards. From the great spreading of an Ulcer it appears that the Lymphatics can absorb & take away the parts of which the body is composed, faster than the Arteries can build them up. The Lymphatic Glands when diseased, & hardened, as they very commonly are in the Mesentery of Scrophulous habits, so as to be felt

externally

externally thro' the Skin of the Abdomen, are full of a cheesy Matter, the coagulable part of the Lymph coagulated, & this Curdly Matter not only plugs up the Lymph:atic Gland, but plugs up the Lymphatic Vessels also, quite from the Intestine to the Gland — We now come to the particular Lymphatics — Those which come from the Intestines are call'd Lacteals; it is probable that they arise upon the Villi by making a Net work; when once the Valves are forced, & the Mercury gets on to the Intestines, there is such an Anastomoses, that it will return, & fill all those in the Mesentery, & between the Muscular & Villous Coats they are numerous, & interwoven, & the Mercury appears to lie in little Cells there — The Lacteals are divided into three or four Classes — those which come from the Intestines, before they enter a Gland are call'd Lacteals primi generis, & from the Spine to the Receptaculum Chyli, tertii generis, — No Anatomist has yet demonstrated the Lymphatics of the Stomach: but at the small Curvature there are small Lymph:atic Glands, from whence we conclude that there are Lymphatic Vessels — The Liver has Lymphatics, which sometimes perforate the Diaphragm, & descend from the Surface of the Liver to it's Substance — We cannot Demonstrate the Lymphatics of the Human Spleen, but we can in the Calf's Spleen — Mr Hewson founds his Theory of the Lymphatics being the only Excretory Ducts of the Spleen, which he supposes has a principal Share in the Form:ation of blood, upon an Experiment that he made by tying the Lymphatics about the Spleen of a Calf, & finding that they contain'd red Globules — But this does not prove that they are the Excretory Ducts of the Spleen more than that they are the Excretory Ducts of the Lungs; for in the Lymph:atics of the Lungs of a Leimp there was found coagulated blood, which hindered the passage of the Mercury — The Lymphatics of the Kidnies have never been seen, & in the Human Heart they yet remain undiscovered — In a Bullock's heart Mr Cruikshank has discover'd them, but where they terminated was not clear — The Lymphatics of the Lungs may be demonstrated very distinctly; many

Anatomists

The Lymphatics

Anatomists have said that they have seen them on the Brain: Dr Hunter has never seen them, & Dr Monro thinks there are none in the internal parts of the Head — the Absorption of the Cantharides shews that they are upon the external parts of the head, & it is likely there are some on the Brain —

In the Turtle & Fish there are no Lymphatic Glands — The Lymphatics are never filled from the Arteries, but by injecting them, & as they dont begin from the Arteries, there was a necessity for their having Valves to hinder the Retrograde motion of the Fluids — In the Extremities, as there are deepseated & superficial Veins, so there are also deepseated & superficial Lymphatics; from a cut of the finger the Lymphatic Glands just above the Elbow will swell & inflame

A Variety of different Theories have been invented to account for their Use — Some have supposed that they suck up extravasated Serum which might have been thrown out, when the Arteries act too strongly; Others thought that they took up the Chyle from the blood to undergo a Circulation of its own, Others that their Sole use was for the Absorption of Fat &c. Dr Hunter asserts that the Red Veins do not Absorb, that the Lymphatics are never injected from the Arteries, & that the Lymphatics are the Only Vessels that do Absorb in the body — He observes that the Venereal Poison always takes the Course of the Glands: if the infection is received at the Penis, the Lymphatic Glands in the Groin are affected, if by the finger, those of the Arm Pit, if by the mouth those in the Throat, if by the Nipple then those in the Breast, are diseased —

Dr Hunter supposes that the Fœtus is nourished by Absorption, for there is no immediate connection between the Vessels of the Mother, & those of the Fœtus, & it is certain that the Lymphatics & Thoracic Duct are much larger in proportion in a Fœtus, than they are in a Child that has been born, or in an Adult — The Semen after it is secreted by the Testicle is Absorbed by the Lymphatics, & carried again into the Mass of Blood, & is supposed to strengthen the System

the System, for it is Observed that men who are much addicted to Venery are very weak, & that those who never use Venery preserve their Strength to a great Age — Dr Hunter supposes that the Lymphatics antagonise the arterial System, that as the Arteries are continually building up the body by adding new matter, so the Lymphatics are continually taking up & carrying out of the Constitution whatever is become noxious & Useless — Fever dont seem to affect the Lymphatic System so much as the Arterial — The Plague is supposed to be got by Absorption alone from Contact, hence an Ulcerated surface is best for absorption: a Chancre is almost always followed by a Bubo; — It seems that in People bit by a mad Dog the Poison is not always immediately Absorbed into the habit; & Mr John Hunter suppose for want of sufficient Stimulus to excite Absorption & therefore advises the part to be cut off, or eat away with Caustics as soon as possible

The Kidney, & Glandulæ Renales

Lecture 52

The Kidney lies under the Peritoneum, & is fix'd down to the neighbouring parts, by a large quantity of Cellular membrane, which generally contains a large quantity of Fat – In the different Attitudes of the body it moves a little upwards, & downwards, it lies against the side of the Spine before the Quadratus & Psoas muscles, & upon a little of the lower edge of the Diaphragm & sometimes in an Erect posture the lower end comes as low down as the posterior part of the Spine of the Ilium, at least it lies before the inside of the last Rib, its Vessels are the Emulgent Artery & Vein that come from the Aorta & Vena Cava; & every now & then, there are small branches coming from the Aorta & Vena Cava, which do not enter the Kidney at its great notch along with the Emulgents, but go in at other parts – The Emulgent Artery enters the Kidney behind the Vein: they were call'd Emulgents because the Ancients supposed that the Urine was milk'd as it were from the blood in the Kidneys: its Excretory Duct is within the Kidney, & as far down as it is larger than the rest, is call'd the Pelvis; the remainder is call'd the Ureter, it runs down to the fleshy brim of the Pelvis made by the Psoas muscles & then down the side of the Pelvis towards the Bladder – Between the upper end of the Kidney, & the Spine upon the Crus Diaphragmatis lies the Glandula Renalis, call'd also the Renal Capsula, it takes Vessels from the Emulgents & Phrenics, & lies in a considerable quantity of Fat: If there is a Stone in the Kidney, nephrotomy has been recommended, & said to have been done successfully; but this Operation cannot be perfomed safely for we have no means by which we can be certain of there being a Stone in the Kidney, as we have in the Bladder; so that we should run the risk of not meeting with a Stone after we had cut: if we cut open an Abscess, of the Kidney, & thus discharge a Stone it cannot be call'd nephrotomy

The Kidney &c

nephrotomy but merely opening an Abscess, & in cutting towards the Pelvis we cant avoid wounding part of the Kidney, for great part of the Pelvis lies in it, we should therefore run the risk of wounding the principal Vessels, and occasion such an Haemorrhage as must prove fatal — The Arteries & Veins go to every part of the Kidney; the Ureter enlarges at the Kidney where it is call'd Pelvis, & divides into a number of short large Tubes in the Substance of the Kidney call'd the Infundibula; beside the Cellular membrane, and Peritoneum, it has a proper Capsula, which easily separates from the body of the Kidney, except where it is blended with the Coats of Vessels that enter at the notch, & leaves the Surface Smooth; its substance is double, there is an outside flesh call'd its Cortical part, & an inside flesh call'd the Tubular part; the human Kidney is compounded of many little kidnies, like as in the Lion, Cat, & other Animals of that Species consisting of a number of Lobuli, which is particularly evident in a Bear's kidney; other animals have a simple kidney not subdivided into Lobuli — In an injected kidney not very minutely injected the Cortical part is all fill'd, & not a Vessel to be seen in the Tubular part: The Vessels all go to the Cortical part first: In every compounded kidney there is an Infundibulum corresponding to each Lobulus, the Tubular part of each makes a body like a nipple, which is received into the Infund:ibulum, & has many Tubuli opening on it; the Infundibulum is fixed all round the nipple; this disposition of the Kidney into distinct portions is more apparent in a Foetus, than in an Adult — The Tubuli arise from the inside of the Cortical Substance & make those which are called the mamillary portions — the number of the mamillary portions, & of the Corresponding Infundibula varies in the human kidney, from six to fourteen generally — In a Simple Kidney there is properly but one mamillary Portion — The Cortical Substance is very

vascular

The Kidney &c

vascular — Malpighi says that by injecting Ink into the Artery, & cutting open the Kidney he saw little bags in the Cortical Substance fill'd with it; the little bags were called Cryptæ of the Kidney — Ruysch saw these Appearances & so did the Other Injectors, but he would not allow that they were bags: He said that they were only small masses of minute Curling Arteries; One Objection to the existence of the Crypta was, that this Appearance was only the Effect of transverse Section of the Arteries; but this is no Objection: Others said that it happen'd in consequence of the Injection being extravasated: Untill Last Winter Dr Hunter believ'd that there were Cryptæ; But Mr Cruikshanks shewed him plainly that these baglike appearances were nothing Else, but curling Arteries, so that Ruysch is certainly right after All — the Cortical part from Mr Cruikshank's injection appeared to be All entirely Vascular — Albinus said that the Tubuli were Continuations of the Arteries & Veins, & that they might be injected from the Arteries & Veins, but Dr Hunter was of Opinion that what Albinus took for Tubuli was nothing more than the Blood Vessels for the nourishment of the Tubular part, & supposed that the Tubuli had never been injected by Any anatomist — Mr John Hunter injected the Tubuli of an Horse's Kidney from the Ureter, but Mr Cruikshanks has injected them from the Arteries & Veins with Wax, & convinced Dr Hunter, that they are continuations of Blood Vessels; by the Artery & Vein too the Pelvis of the Kidney was filled, & the injection was in the very mouths of the Tubuli, that opened upon the nipples — There is often great Variety in the Emulgent Artery & Vein as to number, & sometimes there is more than One Pelvis, & more than One Ureter — The right Kidney generally lies a little lower than the left, because of its being press'd down by the Liver on the right side: sometimes One kidney has been wanting, and sometimes both have been united at one End, and make what is called the Horse-shoe Kidney —

The Renal

The Kidney &c

The Renal Gland, or Renal Capsula has been call'd Capsula Atrabilis & has been call'd both Gland, and Capsula: it is most probable it is a Glandular body; it is exceeding Vascular, and is largest, and most perfect in the Fœtus: it is lost in some measure in the Adult, tho' not so much as the Thymus, the outer Substance of it is firm, and of a yellowish White — the inside which is soft, and made of a brownish flesh may be bruised down to a thick fluid, which was supposed to be the Atrabilis — its Use is entirely unknown neither is it known whether it is Glandular, or not — there is a pretty large Vein runs in the Center, which at first might be taken for the Excretory Duct: — It has no Excretory Duct that we know of —

The opinion that the Kidney has one Artery bringing Blood to it for the Urine to be secreted from, & another Artery bringing Blood for its nourishment is false — they say that in the one the blood is fitted for Secretion, & in the other it is fitted for nourishment, & say that they both come from the Aorta; but even then the Blood in the two must be the same — there dont appear to be any thing of the Kidney, nor in any other part of the body, the Lungs excepted,

It is observed that a fluid drank soon gets into the Bladder: from this some have imagined that there is a passage leading immediately from the Stomach into the Bladder, and lately Dr Morgan was of this Opinion: but there dont appear to be any ground for this Suggestion — It is pretty clear that no Urine gets into the bladder, but what is secreted by the Kidnies — The Urine is made of the redundant Water, & excrementitious part of the body — the excrementitious part consists of an attenuated Oil, Salt, & an Earthy matter: it is absolutely necessary that the Excrementitious part should be discharged from the body, for a person cant live above ten

Days

The Kidney &c

Days with a total Suppression of Urine, tho' the Watery part that is retained be no great Deal; hence it was supposed that there was something poisonous in it to the Constitution — the Sweats that break out in Suppr:essions of Urine are not, as have been generally imagined, of an Urinous Smell, which Any One may be convinc'd of, that attends to this circumstance. Extraneous Matter may become the Nucleus of a Stone in the bladder by being pushed into it, but in the Kidney this cannot be the Case: it must there be owing entirely to the disposition the Urine has in itself to form Crystals — Dr Hunter has found little Stones in the Tubuli Bellidiani in the Substance & pretty considerable Ones in the Pelvis of the Kidney, in short in every part of it. A Stone sticking in the Ureter causes very great pain & prevents the Urine getting into the Bladder, and the Pelvis, & that part of the Ureter which is above the Stone will be greatly distended by the large quantity of Urine retained — If the Patient is not destroy'd by the distension, the pressure of the fluid above the Stone will force it downward into the bladder, & the Symptoms will cease — This seldom fails to be the Case — Sometimes the Substance of the Kidney is all wasted Away, & nothing remains but an Enlarged Pelvis; this was the Case of a Young Lady Whose Abdomen externally was increas'd prodigiously by One of these Enlarged Kidneys — a Sore, or Ulcerated Kidney is a very rare Case, tho' it is suppos'd to happen often: Dr Hunter never saw but One Case of this kind. — Inflammation of the Kidney is very common, & lasts often for a long time, yet very rarely goes on to Suppuration: it causes pain, the Nephritic Colic, & bloody Water; when blood has lain in the Urine some time, it appears when voided of the Colour of Coffee Grounds; oftentimes the Water gives notice when the

Kidnies —

kidneys are affected, yet sometimes when the Pelvis is plug'd up no water can get into the Bladder — Dr Hunter had a Complaint in his right kidney attended with bloody Urine, pain sometimes sever, sometimes dull; it was supposed by his Medical friends to be occasion'd by Calculi; but he could ~~not~~ not think so, for when the pain was dull, if he rode out in his Chariot, the pain was increased in the Jolting over the Payments it turned to be the Rheumatism, for he was seized with it in his Shoulders, and from that time his Nephritic complaints ceased wholly. this Rheumatism was attended with bursting of Vessels, for when it attacked his head, Blood was extravasated in the Tunica Conjunctiva and about the Eye — the Nerves carry on such Sympathies between the different parts as to Occasion many Mistakes in judging of the seat of diseases — A Stone at the Neck of the Bladder gives pain at the End of the Penis, while a Stone in the Kidney shall feel as it were in the Neck of the Bladder; such is the Sympathy of Parts by means of the Nerves —

Physiology of the Abdominal Viscera

Lecture 53

The Anatomy of the Abdominal, or Chylopoietic Viscera has already been given & now it remains to speak of them Physiologically; to follow the order we kept to in the Anatomy, we shall first of all take the Intestinal Tube & then its Appendages.

The Alimentary Tube

The food is changed, & seperated into two parts, the Chyle, or Nutritious part, & the Fæces or Excrementitious part. The food is propelled thro' the Canal by Muscular force, & fluids are carried into the Stomach not by their gravity, but by the Muscular force of the Œsophagus, which is plainly Observed in a Horse drinking at a Pond, for the Water passes thro' part of the Œsophagus against its own gravity; & a Man placed upon his head can swallow. The Muscular Coat of the Œsophagus can contract so as to squeeze a large body into the Stomach, & so as to squeeze a small body into it, even a small Globule of quicksilver, so that nothing can pass thro' the body but by Muscular Action. A Man in St George's Hospital from a blow on his Spinal Marrow had his Abdominal Viscera become Paralytic; so that when he swallowed (for the Œsophagus was unaffected) not having the Muscular Action to propell it forwards, remained in his Stomach, which was found full of what had been given, when his Body was opened after Death.

The inner Membrane of the Alimentary Tube is Much longer than the Other Coats because of the Rugæ, & the surface is still More increased for Absorption by the Villi, or little processes of the inner Membrane. The Manner in which the operation of Digestion is performed has not yet been settled; As Old as the Most ancient Physiologists, & as new as the Most Modern Ones, is the Opinion of its being Only a Mechanical Change by Attrition. & they strengthened their arguments

arguments by Observing that Birds took Pebbles into their Gizzards to Act as a Mill upon the Grain they swallowed: Others have accounted for it Chymically, that the Change was produced by heat, & moisture, as it were by boiling. It was believ'd that the Vena Cava was the fountain of heat, & that for the purpose of warmth, the Stomach was placed near the great Vessels & surrounded by the Heart, Spleen & Liver, which was supposed to make the blood; Others have suppos'd that the food was dissolv'd & chang'd into Chyle by means of a Menstruum; Others that this Change was produced by a fermentation peculiar to the Stomach; lastly many, particularly Boerhave, took in all these powers to explain Digestion even so much as to say, the shake given by the Arteries contributed its Quota to Attrition. All these Theories are liable to Objections; it cannot be heat, that produces this Change, as those Animals that are cold digest as well as those that are hot, & it can hardly be from Attrition, for Carnivorous Birds have no Gizzards, they have Only a thin Muscular Coat for their Stomach; No One can pretend to say what happens in the body, from what he sees going forwards out of it. Mr John Hunter has made a number of Experiments & Observ: :ations on live Animals as the best method, & indeed the Only One he could take to ascertain by what power it is, that the Operation of Digestion is performed in the Stomach. He Observes that All Animals have either their food prepared for their digestion, or prepare it themselves. That Birds are provided with a strong Muscular Gizzard & take in Pebbles too, not to digest their food but Only to act as a Mill to take off the Shell of the Grain they swallow, so that the body of the grain may be digested, which it could not be if the Shell or husk was left on entire, but would pass thro' them unchang'd. An Horse that has lost his Teeth not being Able to break the Husks of his Corn that he eats, will not be Nour: :ished by it, but it will pass thro' him unaltered; & he says that the Grain is not digested in the Gizzard, but goes out of it to be digested by the Other part of the Canal; he concludes that Digestion is a process sui generis, & carried

or as

on as well in cold as in Warm Animals, & that large, & small pieces are equally digested; In animals that feed on Milk, he finds that the Stomach in which the Milk is coagul:ated by the Gastric Juice is the Digester; he finds that the power of the Stomach over:comes fermentation in general; for after a piece of Meat that was putrid had remained in the Stomach of a Dog a little time, he opened the Dog, & found it perfectly sweet; he finds that the power of Stomach is strong in an healthy and hungry Animal; & that it is weak in Unhealthy Animals, & one that is not hungry, so that Digestion goes on in proportion as the Constitution stands in need of it; he finds there is no Ebullition of Air in this process, that the digestive Organs have no power over a living Animal, & can digest an Animal only after it is dead, the principle of Life protects it from the Action of the Stomach; he finds that a Dog digests not only the flesh about the bone, but also the Coats of the Vessels in the bone & extracts the Marrow, so that the bone is discharged with the faeces light & spongey; the digestive power pervades the inmost part of the bone; he finds that the Matter formed by Digestion from all kinds of food is the Same, that a piece of Tripe was turned into the same Cream:like fluid as was a piece of soft flesh in the Stomach of a Dog; he finds that Carniverous Birds (that need not the perforation of flesh which Graniverous Birds do of the Grain) have no Gizzards, & do not swallow Pebbles. It every now & then happens that in opening dead Bodies, we find the Stomach is in some places dissolved into a Gelatinous Matter, so that the Contents are found to have got out of the Stomach into the Cavity of the Abdomen. Dr Hunter supposes this change or Dissolution does not take place till after Death, that as the process of Digestion might be going on at the time of Death, in those cases the Stomach turns it's power on itself, & thus occasions it's own alteration. As a proof of this Mr John Hunter knew a Man that was killed suddenly by a blow on his head soon after he had eaten his Supper of Bread & Cheese & Porter; upon opening his body his Stomach was found to be dissolved, and the Bread & Cheese and Porter were burst out into the Abdomen.

The Appendages

The Physiology of the Liver, Pancreas, & Spleen

The Appendages to the Digestive Organs are the Liver, Pancreas & Spleen: The Mesentery & Mesocolon, as they serve as Ligaments thro' which the greater Vessels run, that carry Blood to & from the Intestines, may be considered as Appendages likewise. The Use of the Epiploon is not made out, probably one Use it serves is by its situation to prevent Adhesions of the Intestines to the Parietes of the Abdomen. The old Physiologists supposed that the Liver made the Blood, that the Nourishment was Absorbed from the Intestines by the Meseraic Veins, & by them carried to the Liver to be turned into Blood, that the bile was an excrementitious part of the Nourishment rejected by the Liver as unfit for being made into Blood, & that the new formed Blood was carried by the Vena Cava Hepatica from the Liver into the Vena Cava, & by it distributed immediately to all parts of the body. This Opinion continued till after Harvey, when the Lacteals were discovered, since then the Bile has been considered as serving some important office in the process of Digestion. It has been said that the Bile coming from the Liver by the Ductus Hepaticus, & that coming from the Gall Bladder by the Cystic Duct, are of 2 kinds, & that the Gall Bladder secreted bile as well as the Liver, & that the Cystic Bile was thicker & richer for Digestion than that of the Liver; but this is a mistake, for they are both the same kind of Bile, & both secreted by the Liver; that the Gall Bladder does not secrete Bile is evident, for if the Cystic Duct is tyed, the bladder dont fill. It has been supposed, that the Liver sent little Ducts to the Gall Bladder to convey the bile into it, call'd the Hepato cystic Ducts; others have supposed that the bile was sent by the Liver down to the Hepatic Duct, & that it regurgitated from thence into the Gall bladder by getting up the Cystic, where the two meet, & form the Ductus Communis Choledochus. In some birds it gets into the Gall-bladder by means of Hepato cystic Ducts, but in the Human body always by regurgitation: this however has been Objected to. Dr Senac, late Physician to the French King in his french Edition of Heister's Surgery, says that the Gall-bladder of a Serpent has no communication with the Liver at all;

that the

that the Duct from the Liver, & that from the Gall-bladder ran a great way toget:
:her but do not communicate — Dr Hunter opened a Snake & a Viper (for the French
word Serpent signifies all animals of that kind.) & found that the Cystic and
Hepatic Ducts did run a long way without communicating, but that just as they
are about to open into the Intestines, they do communicate with each other — The
Use of the Pancreas is not known, it secretes a fluid; probably very necessary to
the Operation of Digestion — A Lady after having been for a long time afflicted
with continual Purging, griping & Vomiting; upon Opening her the Pancreas was
found large & Scirrhous, so that he concludes the Pancreas poured an Acid Juice into
the Intestines, & kept up a constant irritation by its Stimulus — The Spleen is
the Opprobium Medicorum, for its Use is certainly not at all known. The last Opinion
formed of it is that it has a principal part in the formation of the Blood —
But the greatest Objection to this is, that Animals have lived as well without as
with it — A Man at the Battle of Dettingen was wounded by a Sabre on the
left side of the Abdomen, the Spleen was protruded & mortified, so that it was
judged necessary to cut it off, & it was cut off except a very small piece of it
indeed, the Wound healed & the Man did well, & continues well without any
difference in his Constitution to this day — the truth of this fact, Mr Wilson
apothecary in Henrietta Street Covent Garden, can affirm, for he was Surgeon to
the Troop to which the Man belong'd, & did himself cut off the Spleen —

The Diseases of the Alimentary Tube

Lecture, 54th.

First of those affecting the Tube in general, & then of those affecting particu:
:lar parts — It appears from opening many dead bodies, that the narrowest & most muscular part of the Tube is more liable to be affected, cæteris paribus as for instance a bit of bone passing thro' is more liable to scratch a part that is narrow, & that contracts on it strongly — The beginning of the Œsophagus then is often found diseased the Pylorus, the Valvula Coli, the lower end of the Colon & lastly the Anus, which is narrow independent of the Sphincter Ani, which seems to be the reason why we are plagued here with the Piles, Abscesses, & Fistulæ These narrow parts of the Canal being exposed to internal stimuli are most frequently found to be the seat of Ulceration — All Wounds of this Tube, are cæteris paribus, more dangerous, as they are nearer its upper part, for if the Stomach or beginning of the Intestines is wounded from without, the Chyle will escape thro' the Wound, & the Patient will not be nourished, if the Wound be towards the lower end of the Intestines, then a great part of the Chyle will be absorbed before it can come to the Wound. In these Cases the Patient should take only as much nourishment as is necessary to keep him alive, & that should be of the lightest & most nutritious fluid substances; & in large wounds that are high up, we should rather endeavour to nourish him by the Anus; Glisters made of Broth with the yolk of an Egg & a little wine should be injected often in a Day in small quantities & will afford great nourishment having first emptied the Intestines with a Laxative Glister — The Peristal:
:tic motion of the Alimentary Tube is often inverted, & this inversion may begin in any Part of the Tube, this may happen from various Causes — In the Living body different substances irritate & invert different parts of the Tube — Emetics irritate the nerves of the Stomach, & any Stimulus applied to the primæ Viæ will irritate till thrown off: Not only Stimuli on the

internal

internal Surface of the primæ Viæ will produce Vomiting, but also Stimuli on the nerves of other parts: the Eye for instance will occasion Vomiting from Sympathy, thus a Person from seeing a disagreeable Object becomes sick & Vomits; It arises also from mechanical Obstruction as in a Strangulated Hernia - the Peristaltic motion is sometimes suspended: in the first place by Palsy, as in hurt done to the Spinal marrow by a blow, or distortion of the Spine - the nerves being affected the muscular Action is lost in those parts to which the affected nerves belong; it is suspended by an Opiate, for an Opiate does not stop a purging from any astringent quality, but only by suspending the Influence of the nerves, & by that means the muscular motion of the Canal, & so in constitutional Purgings, Opiates can only restrain for a time - the peristaltic motion sometimes so very brisk, at others exceeding languid; there is another Cause that suspends the Peristaltic motion, which we dont understand, it is called a Spasm, this often happens to Gouty People, so that they shall remain many Days without a Stool, but when the Fits goes off the muscular Coat reassumes its power, & there soon follows a very copious Evacuation indeed; Most Obstructions in the Intestines have been thought to arise from Spasm - In every Obstruction the Danger is vastly greater when it is attended with Vomiting - When there is no Vomiting they hardly ever prove fatal - Those Cases which are truely Spasmodic are not attended with vomiting - When the Inversion of the peristaltic motion is attended with Violent pain & continual Vomiting, so that every thing passes upwards, the Patient is said to have the Iliac Passion, or Miserere mei - It has been said that the Iliac Passion is often caused by Spasms, but in all the bodies Dr Hunter has opened that died of this complaint, he always found some mechanical Obstruction - The Iliac Passion is a common attendant in Strangulated Hernias from the Gutt being obstructed, so that nothing passes thro' it besides this (which may be consid:ered as an external Obstruction) there may be internal Obstructions, as when one

part of

part of the Intestine receives the other immediately below it into its Cavity, & makes a Stricture upon it: this is called an Intussusception or Volvulus, & is a very common Cause of the Iliac Passion — the Intestine cannot entangle as in a knot, because of the Mesentery which checks every Intussusception in its progress; Dr Hunter related the Case of a Child that on a sudden cry'd out, & went imme=:diately into Convulsions, & in about 24 hours died: upon opening the body, the End of the Ileum was found to have pushed itself into the Colon, & had pushed up, & inverted the Coecum & Colon, & lay under the Liver, & was so highly inflamed & full of blood that there was no Disentangling it, but tho' the passage was perfectly obstructed, there was no Vomiting from the first Appearance of illness till Death. an Ulcer in the Alimentary Canal is a common Cause of the Inversion, or Iliac Passion, it stimulates the Muscular fibres so that the Intestine always keeps small, & by becoming Callous from the inflammation, the Obstruction is comp=:leated, & the Intestine has no way of freeing itself of its Contents, but by setting up an inverted Peristaltic Motion — Another Cause of Iliac Passion is a thickness, hardness, & tightness of the Coats of the Intestine, analogous to Scirrhi; It arises also from Intestinal Calculi plugging up the passage. It is a question whether there can be a total inversion of the Peristaltic Motion from the Anus up to the Mouth. this has not been decided — But then can the Contents of the great Intestines get up to the small by passing the Valvula Coeci? Some say that it does not act as a Valve in the living body. It is said that at Edingburgh, the Matter of a Glyster was vomited up, & this is said to have happened often — But Dr White told Dr Hunter that there was cause to believe, that there was a growing together of the Colon, & upper part of the small Intestines, & a way by this Means from One to the Other in consequence of a Suppuration, for the Glyster came up immediately, & did not remain a suffi=:cient time in the body to be forced backwards along the Convolutions of all the Intestines — We come now to consider the diseases of particular parts. First

obstructed

The Diseases of the Alimentary Tube

Obstructed Deglutition — Difficulty of swallowing is a very common disease, & often arises from a very Melancholy cause, from the Dilatation of the Coats of the Oesophagus forming a Pouch, sometimes it comes on very rapidly, sometimes very gradually & imperceptibly — At first some difficulty is met with in swallowing solids, afterwards a difficulty of swallowing fluids — the Patients in this Case become exceeding weak, for a considerable time before they expire; for the difficulty of swallowing increases so much that they are literally starv'd for want of being able to take down any Nourishment. Physical People often Mistake these Complaints for Spasms, but Dr Hunter never knew Obstructed Deglutition owing to that cause — Swallowing any hard body, which makes a lodgement in the Oesophagus, hurts that Canal, & makes it sometimes dilate into a Pouch; in swallowing which is performed with great difficulty & labour, the food is received into this Pouch, but is soon thrown up again, the Patient grows very weak in consequence of not being nourished & Dies, which was the Case of a Gentleman at Ludlow from swallowing a Cherry-stone which lodged in his Oesophagus, & came up some time after. The Case was communicated to Dr Hunter by the Surgeon who attended him, who also made the Dr a present of the Oesophagus, which he shews — the Case is published in the Med: Obs: & when difficulty of Swallowing comes on, it cannot be said from what cause it arises — It may be from an Ulcer, from a Stricture, or from a Dilatation of the Oesophagus, or from Something Else — It is better then, not to force down Bougies, Probang, or other Instruments, for the Oesophagus cannot bear it, a Gentleman had a difficulty of swallowing supposed to be owing to Stricture, & he was thought to have preserved his Life by means of a Golden Ball, with a string fastned to it, which he frequently swallowed, & drew up again, & by this means prevented the stricture from encreasing so much as to hinder Deglutition entirely; notwithstanding this it is never adviseable to poke into the Oesophagus, unless

with a —

The Diseases of the Alimentary Tube

with a View of getting something out, that has been recently stuck there — In these we can do nothing, I advise smooth & fluid nourishment to be swallowed gradually, to give the Ulcers a chance of healing if there are any, & a Mercurial Course by Unction — There is a Case related by Dr Monkley in the Med: Trans: in which this method has proved successfull — Professor Cleghorn of Dublin with the help of a Probang with two strings fastened to the end took a Goose Quill out of an Oesophagus by entangling the feathered part in the string. & many ingenious Men have contrived various Instruments to take bodies out of the Oesophagus — Dr Hunter has an Oesophagus in which an half Crown is sticking & which was the Occasion of Death — Small sharp bodies, such as Pins, Needles, &c when swallowed do in general but little mischief — The Peristaltic Motion will have more Effect on the head, or thickest head, & by that means, the Needle, or Pin will be carried thro' all the Convolutions of the Intestines with the head foremost with great Security — Such small bodies will often work their Way from the Oesophagus, & other parts of the Alimentary Tube thro' the flesh without causing Suppuration, & comes out at a very distant part, because all Motion will tend to force the body of the Needle one Way, the head being blunt — It is wonderful what becomes of some things that are swallowed, & never heard of after tho' the Stools have been most minutely inspected — Wounds of the Oesophagus are generally fatal — They are most commonly attended with Wounds of other principal parts — In these Cases We must support the Strength by nutritive Clysters, & avoid disturbing the Oesophagus by swallowing — Boerhaave describes a Case in which the Oesophagus was ruptured quite thro' transversely just above the Diaphragm — A Man was carried to St George's Hospital with a fractured Skull, quite senseless from the moment of the Accident, of which he died; he was wrestling, and thrown by his Antagonist on a

marble Floor

marble. Floor — Dr Hunter as he was just examining the Thoracic Viscera, accidentally discovered a longitudinal Rupture of the Asophagus, & supposes it was done by his Antagonist at the time of the throw, having one Arm round his neck so as to compress the Asophagus, & the Arm round his belly so as to press the Contents of the Stomach into the Asophagus, & burst it — The Stomach is a very nervous sensible part; the nerves of different parts seem to convey a different kind of feeling to the mind, hence when the Stomach is wounded, or hurt, the pain seems to be sui generis, it is not an Acute pain, but exceeding oppressive, the Patient is Unmanned, & sinks surprizingly fast — The Stomach appears to be a great Center of Sympathy with all parts of the body hence a nausea, when food is improper — Pregnant Women are liable to frequent Vomitings, because in the first months, the Constitution requires but little nourishment, or they would be too full of blood — When Poison has been taken, we should give an Emetic that will operate quickly, as White Vitriol. If the Poisonous Substance is of that kind which may be diluted, we should give large quantities of Oil, milk &c and when the Stomach is well cleared, we must purge, and give plenty of watery things — Wounds of the Stomach are almost always mortal — Ulcers are not unfrequent in the Stomach, chie:fly about the Pylorus, and are attended with great Languor — Diseased Stomachs especially when attended with Inflammation are very irritable; when there are frequent Vomitings we may suspect the Stomach to be considerably affected, yet we are not to say, they are caused by Ulcers, or Scirrhi; for it most commonly happens from other Causes — It is probable that most Cases of irritable Stomachs are owing to some incapacity in the

Stomach

The Diseases of the Alimentary Tube,

Stomach to digest properly. By attending to the quantity and quality, that the Stomach is able to bear, and Adhering to that, in time it will recover itself and become gradually able to digest more, and Stronger food; oftentimes a Teacupfull of any Liquid will cause a Violent Vomiting &c from its bulk, while a Spoonfull of the same kind will be digested kindly. A Boy of about 12 years of Age was very much reduced and Emaciated from frequent Vomitings so that whatever was given him would not remain on his Stomach; the fault was, that he took food of a different quality, and more in quantity than it could digest, so that it was rejected; for by attending to what quality & how much of food agreed, he got well; he took so small a quantity as a Spoonfull of Milk for a Meal, which agreed perfectly well, so that the Stomach had time to recover itself, and as that happened, the quantity was increased, till he could digest any kind of Food

The Diseases of the Alimentary Tube

Lecture 55th

It is very hard to guess at the nature of internal disorders whatever some People may pretend to &c. Dr Hunter once found an encysted Tumour on the inner Surface of the Duodenum near the Orifice of the Ductus Communis Choledochus which it was impossible any one should have known – Sometimes there are formed little knobs on the Villous Coat, which seem to have been mistaken for small-pox pustules on the internal Surfaces, but they are little processes or grains upon the Villi, & are found in people not afflicted with small pox. This appears to be an inflammation & Suppuration peculiar to the Skin externally exposed, & not having the least tendency to affect internal unexposed Surfaces, for the Fœtus in Utero, whose Skin is not exposed, is not affected with Small pox. In these Cases where Dr Hunter has seen a Woman with Child affected with the Small, the Child has sometime or other afterwards had the small pox, as others have it, so that it appears that the fever is never communicated to the Fœtus from the Mother – Ulcers in all the Intestines are very common, & are always attended with diseased & indurated Mesenteric Glands, & Disease of the Lymphatic Vessels, they are stuffed full of the Coagulable part of the Lymph coagulated in them – In the Ileum a little above the Cæcum is frequently found a Diverticulum or Pouch of Intestine One of this kind was found to have formed a Rupture of itself by a Person who operated to free the Stricture – Sometimes the Coat of the Small Intestines are found full of a Whitish, Chalky Substance, this is an Ossification of the Intestine. Mr Cheselden mentions an Ossification found in the Omentum of a Sheep which is a very common thing – The Cæcum is the place where indigestible things will most likely lodge, as at one time it was the Custom to swallow Cherry Stones along with the Pulp, which accumulated in the Cæcum & caused inflammation & abscess towards the right Groin, which being opened gave discharge to the Stones

The Diseases of the Alimentary Tube

Stones, & this was fatal to many People. The Cæcum made a pouch that became a receptacle for every thing that was indigestible. A man in Cornwall had a Suppu:ration in his Groin, (as was supposed from a neglected rupture) & stricture, about three Inches of the Intestine was sphacelated & cut off: the Wound healed up & the Stools passed as usual, & the man got perfectly well; sometime afterwards he died, & Mr Simmonds of Exeter opened his body: the Gut that was cut off was found to be the Appendix Caci Vermiformis, & large side of the Cæcum, so that the Canal was entire & a passage was left for the Excrements to go on to the Anus. This Case is published in the Med.l Obs. &c. and probably was a suppu:ration from an Accumulation of indigestible matter or hardned Fæces in the Cæcum. Almost all Ulcers in the Intestines are attended with purging, pro:bably enough from the irritation produced by the discharge from them. Sometimes the Ulcer contracts the Canal of the Intestine & produces the Iliac Passion from obstruction. Dr Hunter knew a Lady that died soon after having had a copious Stool of pure blood: it was found to proceed from an Abrasion of an Artery by an Ulcer in the Ileum. Sometimes an Ulcer is found in the Rectum of a truly Cancerous nature, which keeps up a constant irritation, and the Stomach & other parts of the Bowels are affected by Sympathy. A French Woman had several hard Tubercles at the lower part of the Rectum, which occasioned a constant Tenesmus, & her Stomach seem'd to be the part affected: she took Cicuta & other Medicines but to no purpose, for all round the Anus became one large Cancerous Sore before she died. Sometimes without taking any metallic Preparation, or from any other apparent Cause, the Stools are black; this was supposed by the Ancients to be occasioned by Black Bile, or Atra Bilis as they called it: It is owing to Blood shed into the Intestines from an Abraded Vessel, which blood is first of its natural Colour, & is changed to a darker & darker Colour, as it goes farther from the Vessel: which was evidently the Case in

a body

a body that Dr Hunter opened & that died with this complaint, In this case we must naturally suppose that all Purgative Medicines will be of great detriment — the Slime that comes away in the Dysentery is pushed out from the Colon & Rectum, particularly from the last; this was found to be the Case in those bodies, that died of the Epidemic Dysentery some years ago, & Dr Hunter says, that he found the little Glands of the Intestines Colon & Rectum enlarged, & full of Slime — In Dysentery as to Faeces the body may be said to be costive, for no faeculent matter comes away, & if a Purgative be given, then a great quantity of hard faeculent Lumps are brought away Old People have often a Collection of hard Faeces accumulated in the Rectum which are not discharged, tho' a Purgative is given; these should be broken with the finger, or a Spoon, & a Glyster thrown up to bring them away There are a few Cases related of the Intestines being wounded & healing so as to form with some external part of the Abdomen an Artificial Anus — Albinus has given the Case of a Man that was wounded in the side at the battle of Ramillies, & the Weapon cut into his Colon; the divided Intestine united with the Integuments round the Wound, & made an Artificial Anus in the Side Quadrupeds have frequently recovered from Wounds of their Intestines — In the Country it often happens that a Cow or an Ox gets into a field of Clover, or of Turneps, & by eating of them becomes blown up with Air in the Intestines, & is greatly disordered. The Country People to relieve the Beast pierce the Intestines in several places with a pointed knife to let out the Air, & it commonly gets well after it — A Farrier that was rubbing the Tonsils of an horse with a long piece of wood, happened to let it go, & the horse swallowed it; some time afterwards it made its Way out thro' the side of the Abdomen — Three Species of Worms are commonly found in the Intestines: the first is the Teres or round Worm like an Earth: Worm: the second is the Tape Worm, the broad or the jointed Worm: the Worms of this Species are full of Joints, & the different appearance that these

Joints

Joints make is commonly owing to the different contraction they suffer at the time of their Death. There is some Variety however in the internal structure of the Joints of Tape Worms. Each tho' has a ramifying Tube within & a speck in their Middle. It has been disputed whether this is One Worm or a Chain of Worms. Mr John Hunter from observing that each Joint can contract itself independently of any Other, is of Opinion that it is a Chain of Animals adhering together, as we often see Other Animals of the imperfect kind do; it is found more in Switzerland, than in any Other Country. The third kind of Worm, & to which Children are very much Subject, is the Ascarides, a very small Worm, & many of them are always found together in the same body. Another Worm of an extraordinary Nature has been described in the Lond: Med: Ess:, said to have come from the body of a Man in America; but Dr Hunter, tho' he has got it & shews it, doubts the truth of the story, as he never saw any thing like it before. Much has been said about Fevers, & other Indispositions supposed to Arise from Worms, because at those times Worms have been passed, but they are often passed in good health. Children especially who are said to die of Worm fevers, (it is lately found) die of the Hydrocephalus Internus, & when they have been said to have died from Worms, upon opening the Intestines no Worms have been found; so that it is most likely, that Worms do little, or no Mischief. In Fevers & other Illnesses Worms come away from the body for the same reason that Rats leave an house when it is on fire, as was Observed to Dr Hunter by a Friend of his a Surgeon at Newcastle.

The Breast

Lecture 5th

The Situation of the Breast is well known; it is a glandular body for the Secretion of Milk, which it secretes only at particular times — The Glandular Substance is intermixed with a considerable quantity of Fat; Some consider it as One Gland, some as a Cluster of Glands; its inside is pretty flat & lays on the Pectoral Muscle — Winslow describes it as enclosed in a Capsula, but there is nothing like this appearance, & the Glandular part is so irregular, that the Capsula must have gone in every where round it, & if there was any it could not be missed off; what he describes as a Capsula is only Cellular Membrane — The Glandular part is plainly distinguished by its white Colour, from the Fat which is Yellow, & in great quantity, running in some parts almost thro' the body of the breast: the Edges of the Breast are exceeding irregular, & are insensibly lost in the Cellular Membrane; A little Process or kind of Tongue from the Breast runs quite into the Arm Pit under that anterior part of the Pectoral Muscle, which makes what Dr Hunter calls the anterior fold of the Arm Pit — therefore when we want a Breast for Preparation we should cut it off very large least we wound the Edges of the Portions, & the injection escape thro' the divided Tubuli; we should cut off a part of the Integuments of the Arm Pit especially — The Glandular Substance in a flaccid breast feels hard & knotty, because the Fat is soft & fluid between the different parts of the Glandular Substance, & this is more particularly the case in Old Women; where there is but little fat in them the breast feels exceeding flaccid & tough as Leather — Women dread Cancers and Scirrhi, and when our Judgment is asked for violent pains in the breast, we should be cautious that these knots do not deceive us; the best way to judge is to compare the bad breast,

The Breast

Breast, with the Other; & if it feels the same we may be pretty sure, it is not a Scirrhous Case, for it usually happens that only One Breast is Scirrhous at once, In a Woman that is with Child, or that gives Suck, the Glandular Substance is soft & red from its having a great number of Vessels that carry red blood. The Breast has no Center of Ramification, for its blood Vessels are principally from the Axillary Branches; besides Arteries, Veins, Lymphatics, & Nerves, it has Excretory Ducts, the Tubuli Lactiferi, which have a Center of Ramification at the Nipple. The Nipple is nothing more than a bundle of these Tubes connected together by Cellular Membrane, & has generally from twenty to Thirty Orifices on it. The Tubuli are small at the Nipple, but increase as they recede from it, & become small again; they serve as Reservoirs for the Milk, for the Breast has no proper Bag or bladder, as the Liver & Kidneys have. Where the Tubuli begin we don't know. Nuck says he could inject them with Quick Silver from the Arteries; but as no One Else has done it, we doubt what he says. Winslow, & the present Professor Monro say, that they anastamose round the Basis of the Nipple; this dont appear to be true. There are Sebaceous Glands round the Basis of the Nipple in the Areola. In many Young Women when with Child, the Nipple & Areola alter their colour to a deep brown or black Colour like the Skin of a Negro. This Change is looked upon as a strong Mark of Pregnancy tho' sometimes it does not change during all the time of being with Child, after Delivery it commonly reassumes its former Size & Colour. In the Adult body there is nothing Glandular under the Nipple, but there is in the Foetus both Male & Female, and in very Young Children. It is a common thing for Children a few days old to have their little Breasts inflame, grow full, & have a quantity of fluid in them similar to Milk, which when the inflammation has subsided, may be squeezed out in considerable quantity. Dr Hunter never knew One End in Suppuration. There have been Accounts of Milk being

secreted

secreted in the Breast of a Man, but D^r Hunter never could discover any the least Glandular appearance in any Man. Milk was supposed to be mere Chyle strained from the blood by this Gland, & in support of this doctrine, it was said that Milk which is a fluid not yet perfected into blood, has the property of growing sour, because it is made principally of Vegetable food, & farther that the Milk of Animals who live on Animal food putrefies, but will not grow sour in standing. this was generally believed, but M^r John Hunter proves the Contrary, for he fed a Bitch on Tripe & Water & nothing else, the Milk that she gave grew as readily sour as any other Milk taken from an Animal that feeds only upon Vegetables. from this experiment it is incontestible, that Milk is a secreted fluid, prepared by something more than a mere Separation, & has new properties given to it in the Breast. There is hardly any difference between the Milk of different Women. One perhaps shall have it a little thicker than an other, but both are equally good for nourishment, tho' the thinnest is commonly preferred even when so thin as to appear blue; the best way to judge of the consistence of Milk is to catch a little in a Glass, & shake it round the sides. There is a remarkable Sympathy between the Breasts & the Uterus. They encrease very fast at the time of Puberty. Some have accounted for the Breasts swelling in pregnancy from the Epigastric Artery being compressed by the Gravid Uterus, which they say will cause a greater quantity of blood to flow to the upper parts of the body: now in a Dropsy the Compression of this Artery is often more than during the time of pregnancy, yet the Breasts do not swell, it is plain that it cannot be explained on Mechanical principles. It is a common observation, that if the Child dies in Utero, the Breasts from being full & turgid grow flaccid all at once; A Woman was bruised so as to have a Child in Utero killed, three or four days afterwards the Breasts swelled very much, & six or seven Days after the Child came away quite putrid: in one Sense Labour might be said to be over on the Death of the Child, & then in three or four Days after (the usual time after Delivery) she began to make ready the Breasts for

the secretion

the secretion of the Milk — That Milk which is secreted & is not drawn out of the Breasts, is absorb'd into the Constitution; While the Milk is going off, there is commonly a little Fever with Rigour &c. and the Lymphatic Glands in the Axilla swell from the repletion of Milk — It is a general rule at this time to keep the Neck Warm, & rub the Breasts with Warm Oil, & if they grow hot & fiery to apply a poultice, & leave them to break of themselves, & afterwards to apply nothing but poultices, & they will almost do well — Cancer hardly ever comes from the Milk abscess, or the sore that is left by the abscess so seldom, that Dr Hunter never knew but one Case of Cancer, that was ever suspected of this beginning; Substances may be absorbed from the Skin of the Breast, & lodged within the Gland — A Lady had used some Camphorated Spirit of Wine to her Breast, which was inflamed, but before it suppurated, she discontinued the use of it, when the Abscess broke, the matter smelt offensively strong of Camphire, tho' none had been used for a Fortnight

The Lungs

They are divided into the right & left Lung — the Substance of the One has no Connection with that of the Other — Each Lung is subdivided into Lobes; the left is always divided into two by an Oblique Fissure, the right Lobe has a little fissure, & another Small One, so that it is divided into two large, & one small portion — Each Lobe seems to be composed of smaller Lobes, & between them run the Lymphatic Vessels — In figure they represent exactly an Ox's Foot; they are every where loose except just where the great Vessels enter; anteriorly they make a Concavity in which the Heart in its Pericardium is lodged — The Great Vessels enter immediately in the Middle of the Lungs; on the inside this part is called the Root of the Lungs — The great Vessels are first the Aspera Arteria which divides into two branches, one to

The Lungs

one to each Lung, and enters behind the Blood Vessels; secondly the Blood Vessels are the Pulmonary Artery and Veins. The Artery, just behind the Aorta divides into two branches, both of which go the Lungs; the right is by much the longest; the left is very short; — from each Lung two Pulmonary Veins come, which soon enter the left Auricle of the Heart behind, & a little below all the Other Vessels from the Heart. — The fore part, & sides of the Trachea Arteria are composed of a Number of Cartilaginous rings, called the Sigmoid Cartilages, their Ends are joined together by a Membranous, or Muscular Substance; so that this Canal is Cartilaginous before and laterally, and muscular behind; each ring is joined to that Above and below it by a Ligamentous Substance; which is a little Elastic. — All Along the Muscular part are small grains supposed to be Glands, called by Morgagni the Tracheal Glands. — The Trachea is lined internally with a Smooth Membrane, which is a continuation of the Internal Membrane of the Mouth. — These Sigmoid Cartilages as they approach the Bifurcation of the Trachea, become more & more irregular till their form is quite lost. — The Trachea has this particular Structure to resist the pressure of the Atmosphere, and retain a passage for the Air into the Lungs. — If the Trachea had been a flexible Tube like the Aorta, we could not have breathed, because its sides in Inspiration would be closed as the Cheeks are drawn inward; and bone would not have been so well as Cartilage, because every branch in Inspiration must Stretch, and bend considerably; the Structure of the Trachea is different in different Animals.

The Tracheal Glands secrete a Mucus, which serves to keep the internal Surface moist; the thinner part of this Mucus is carried Off by the Air, while the thicker stagnates; now had the Trachea been Cartilaginous all round, this Mucus could not be coughed up, because the Inspired Air would press it, as much

as much down, as the action of the Diaphragm &c in coughing would throw it up, but the muscular part can so contract the passage in Expiration, that the Air cannot pass without forcing it out — Besides the Blood carried into the Lungs by the Pulmonary Artery (which may be considered as bad Blood from having gone to nourish the bronchial Artery: Galen knew this but not that it was a Blood Vessel) the Extremities of the Air Vessels terminate in very small Cells, which become apparent from injecting Quicksilver into the Trachea, and drying the Lungs — It has been supposed that the Extremity of each Air Vessel was dilated, and formed its own proper Cell — The Lungs have Lymphatic Vessels, which run on their Surface between the Lobuli, these pass thro' Lymphatic Glands placed principally in the Angle between the ~~the~~ two branches of the Trachea, they are of a bluish Colour like the Colour of the Lungs themselves —

Lat 57

The Use of the Lungs

Lecture 57th

The Lungs are undoubtedly for Respiration — Some of the Organs of Respiration are active, as the Respiratory Muscles, & by these the Ribs; Others are passive as the Lungs, which perhaps are a little active in Expiration by their Elasticity — the Chest may be considered as the Boards of a pair of bellows, the Lungs as the Cavity of the Bellows, & the Trachea as the pipe of the bellows: when the Chest is dilated there is a Vacuum within the Lungs, & the Air rushes in, this is Inspiration; when the Chest contracts, it presses against the Lungs, & squeezes out the Air this is Expiration. There is never any Air in the Chest, tho' this has been contradicted; For if you immerse a body under Water, & puncture the Chest the Water will rush in, but no Air comes out, for no Bubbles arise, provided that no Air is let loose into the Chest by Putrefaction — It is said that the Blood is squeezed & compressed in the Lungs; In Inspiration there can be no compression, for every thing within is then entirely passive, Compression does not begin till the time of Expiration — Expiration seems to be the most natural state of the Lungs, & more passive than Inspiration; for their Elasticity contracts them to a flaccid state, & expels the Air, & is therefore the last Action of Life; Their very Weight tends to contract them — The Reason of the Succession & alternation of this motion has not as yet been made out, tho many have contended for it; It is a mixed motion, that is, Voluntary & Involuntary — Some Physiologists have said that the Nerves are compressed in Inspiration by the Action of the Muscles, which then become Paralytic, and Expiration follows from the Elasticity of the Cartilages of the Ribs & Lungs, & then the Muscles acting as before, the same thing follows again; but the Muscles are made to act very strongly in Expiration — This Motion is something necessary to Life, for if it be stopped

The Use of the Lungs

stopped, we grow uneasy, & cannot continue stopping it any longer, & therefore Dr Whytt says, it is a Motion in which the Nerves are chiefly concerned: It is very plain, that it is not made out by any Physiologists — Generally but a small quantity of Air is thrown in & out at one time in an easy unconcerned Respiration — Since Dr Hales's Experiments on Respiration all Anatomists agree that the blood circulates quicker in the Lungs, than in any other part — Dr Hales makes it 43 times quicker; If this was the Case we should find the Coats of the Pulmonary Artery thicker than they are, but they are weaker & thinner than in any other Artery; The Blood that has been carried to all parts of the body by the branches of the Aorta, is unfit for that use again till it has passed thro' the Lungs — If the Animal has but fresh Air thrown into its Lungs, it is not necessary they should act to continue the Life, for Dr Hook opened a Dog's Chest, & made several punctures into the Lungs, then he put the pipe of a pair of bellows into the Trachea by the Mouth, & by forcing in fresh Air kept the Lungs constantly distended, & the Air made its way out at the Incisions; by this means tho' the Lungs moved not at all, the Dog continued alive & strong, for a length of time, till he killed him: This Motion dont correspond to the Motion of the Heart, for tho' we vary Respiration voluntarily, the pulse continues just the same, unless we force it exceedingly; after Death the Lungs are always found distended with Air, the quantity of Air that is inspired at the last of Life, is not afterwards all thrown out in Expiration, for the Chest not closely compressing the Lungs, they contain always some Air in their state of greatest Expiration — Some Animals have no Lungs In Fish Respiration is carried on by the Gills — All Animals that have breathed require fresh Air, tho' Fish dont require it so often as we do — The Child in Utero lives without breathing, but it has a Circulation from the Placenta which answers the same Purpose, & if the Navel String is compressed the Child dies — Whatever interrupts Respiration in a breathing Animal, kills it in a few Minutes — It was said that an hanged Person died merely from Respiration being stopped, but

not from

The Use of the Lungs

not from Apoplexy by the Veins of the Neck being compressed so that the Blood accumulates in the head; Others have said that the Spinal Marrow is crushed by the Necks being broken; but as they hang People at Tyburn the Neck is not broken — When People are apoplectic they dont always die immediately, but lie snoring for some Days, now hanged People die in a few Minutes always, so that their Death depends upon the Obstruction of Respiration, without which we cannot live above five Minutes. It has been said that drowned People die from the quantity of water swallow'd down; but it is found that the quantity of water is always very small — Others have said that a Drowned Animal was suffocated from taking water into the Lungs — But in fact it does not, for never any is taken in till the Animal is become Senseless — It dies from loosing the benefit of Respiration as those do that die from being hanged — The Dutch have lately attended a good Deal to the reviving of People recently hanged, or drowned, & in many Cases they have succeeded: to be of service this Way, we must take any Method for giving warmth & Circulation, by rubbing the body all over with any thing that is harsh, we must force fresh Air into the Lungs which is the best Stimulus, & get warm Cordials into the Stomach to invigorate, Warm Wine should therefore be syringed into the Stomach by a flexible Tube put down the Oesophagus, by these Means People may perhaps be retrieved who otherwise would have been lost — When People die suddenly it is called Apoplexy, & it commonly happens from the Rupture of some principal bloodvessel near the Heart, or perhaps from a Rupture of the Heart itself — the late King's Death was occasioned by the bursting of the right Auricle so that the blood got into the Pericardium, & he expired immediately — Mr John Hunter that no Animal is Amphibious, as we accept the Term; for a Turtle has Lungs & must breathe, tho' he can live for a considerable time without breathing so can a Diver, & so can a Duck; but they must breathe after a longer a shorter space of time: he Observes that Fish will die in Ponds that are frozen for want of Air, but if the Ice is broken they are not affected — Fixt Air is fatal to animals

The Use of the Lungs

Animals, & so is inflammable Air – The Common Atmospheric Air is the Only Air that is fit for Respiration, & will support us in Life very well from 16° to 118° Farenheit Thermom: & a Bear in Siberia lives in Air 30° underweight of Farenheit Thermom: : The Atmospheric Air contains some quality for Respiration, & for the burning of fire it has it's Pabulum Vitæ et Flammæ, this Pabulum is consumed by Respiration & Fire, & then the remaining Air is unfit for either, & will kill an Animal, or put out fire; this is one of the Discoveries of Dr Priestley – the Dr further observes, that Air which has had it's Pabulum Vitæ destroy'd by an Animal, having breathed it, will have it's Pabulum renew'd by fire burning in it, so as to be again fit for Respiration, & on the contrary that Air which has had it's Pabulum Flammæ destroying by fire burning in it, & extinguished the fire, will have it's Pabulum renewed by an Animal breathing in it, so as to become again fit for fire to burn in it – An Animal does not die, nor does a Fire go out, till the Pabulum of Life, or of Fire is destroy'd: & the Pabulum of the One is different from that of the Other – The fixed Air that is set loose from the dissolution of bodies floats in the Atmospheric Air, & would accumulate & render the Other unfit for Respiration but it is absorbed by Water, especially by running Water, so that it never accumulates so much as to make the Atmospheric Air totally unfit for Respiration, for this reason it is that places situated nigh to running Water are most healthy. Fix'd Air is heavier than Atmospheric Air; this is particularly evident in the Volcano-del-Carne, in Italy for in this Cave there is always a considerable quantity of fixed Air, which being heavier than the Atmospheric Air falls down, & covers the Ground only, to a certain height above the Surface, all above that is Atmospheric Air, so that if a Dog goes into the Cave, his head not being higher than the fix'd Air, he is kill'd directly by it, but if a Man goes in, his head being higher than the fix'd Air, he can remain there with impunity as long as he pleases – Dr Priestly finds that Air made unfit for Respiration by it's having been breathed in, is again made fit for a Plant growing in it: the Pabulum Vitæ is restored by Vegetation going forward in it – It is a question what immediate Use Respiration is of to an Animal? The Ancients supposed it gave the ~~Heart~~ vivifying heat, but heat does not depend upon Respiration – Mr John Hunter thinks that heat arises from some Animal-Process within, that is not understood

understood, & that we have in Us a principalle of heat & Cold, that Cold is generated in us as well, as heat. The standard of heat is about 98 of Farenheit Thermometer; in all degrees of the Atmosphere, and an Animal generates more or less heat in proportion as he loses more by its flying off to heat the surrounding Atmosphere, for if that is hot he will generate but little, because he loses but little, if that is cold he will generate more because he loses more. he finds there is a principle to generate Cold, for a man in the Cold fit of an Ague, or that grows sick at the Stomach, grows sooner cold externally, than if he were inanimate & previously heated to the same degree; he finds that the Animal Juices are proof against freezing, till Life is destroy'd, for a fish cannot be frozen till after it is killed by the Cold, & till it is killed it will keep the Water immediately surrounding for some little distance in a fluid state. It was thought that an Animal would be killed by the heat arising from the many Processes going on within it, were it not for the Air of Respiration cooling it; but this is wrong, for the heat of a man's body is the same internally, in Cold as in hot Weather, & is never killed by an Atmosphere considerably above its own standard of 98 Degrees of Farenheit Thermometer.

Many have laboured to discover the effect which Respiration produces on the Blood, but no One has yet made it out. Mr John Hunter thinks that it carries off some noxious Effluvia from the Lungs, & thus keeps us alive, but he can make out no more, than that it is necessary for Life, & that it alters the Colour of the Blood. Respiration is of Use to us in sucking. In Smelling the Air serves us as a Vehicle for the Odoriferous Effluvia; but its most principal Use is that it gives Voice, in Expiration we produce this Sound.

Diseases of the Lungs

Lecture 38th

Difficulty of Respiration may arise from various Causes; Water in the Cavity of the Chest on the Outer Surface of the Lungs will produce it by preventing their being duly expanded — In this Case it is a common Symptom for People to awake out of their Sleep in frights & horrors with Palpitations of the Heart: If the Water is only in One side of the Cavity, yet it presses the fleshy parts towards the other side & so affects that: People with this Complaint can always lay best on the diseased Side, because this side is in a manner useless, & if they lay on the well side, the weight of the body presses on the Ribs of that side, which is a great impediment to their Action: Water in the Abdomen presses the Diaphragm upwards which makes People with this disease breath best in an Erect posture, because then the Weight of the Water will tend downwards, but if they lay down, it requires great force of the Muscles to counteract its pressure; In Leucophlegmatic habits, sometimes the whole Cellular Membrane of the Lungs shall be full of Water, while perhaps there is but little Water in the Cavity of the Thorax: we cannot distinguish this Case from the Other by the Symptoms, it can only be done by dissection after Death — Air extravasated in the Substance of the Lungs or Cavity of the Thorax has the same Effect as Water, because it takes up Room; this was One Symptom in the Black Cattle, when they were diseased in such great numbers about years ago, they had a general Emphysema, & Air was extravasated in the Lungs — the most common Disease of the Lungs is Inflammation & Suppuration: the common consequence of inflammation on the External Surface is Adhesions to the Pleura: When Suppuration happens it leads On to the true Pulmonary Consumption: the Matter which is formed having no depending drain is coughed up: Consumptions are most frequent from Puberty, to the Age of 25, & most common to Scrophulous habits: Persons so Afflicted are apt to cough up stones, very hard mucus, & sometimes substances in form of

ramifying

ramifying Vessels, these are not blood Vessels, but inspissated mucus, which by stagnating in the Vessels takes their form: in such Cases there is a disposition in the Trachea to form an Apthous Crust similar to those sometimes found in the mouth – it is this matter covering the flesh that gives it that peculiar Appearance

The Heart is the great Engine of Circulation; it is composed of four muscular bags, placed between the termination of the Veins, & the beginning of the Arteries; two from when the Veins arise, the Auricles, & two from whence the Arteries arise, the Ventricles, its Apex or point is pretty regular, its Basis irregular; its underside is flattened & lies upon the Diaphragm; it has an Oblique position in the body, its Apex lying forwards & a little towards the left side; put the middle part between the right & left Pulmonary Veins directly backwards & then the Heart is in its proper position – It is divided into the right & left Auricle & Ventricle: but Winslow on account of the Oblique position chuses to call them the Anterior & Posterior Between the right & left Auricle & Ventricle is a Septum, which we call Septum Cordis, Septum Auricularum et Ventriculorum – the Veins terminate in the Auricles, as far from the Apex as possible, two in the right, & four in the left; the Arteries arise from the Ventricles nearer to the Apex than the Auricles – the two Auricles are applied to each other at their lower part, but there is a vacant space between them at their upper part, which is filled up by the two Arteries which decussate each other at their beginning – the right Auricle was called by the Antients the Sinus of the Vena Cava, & the left Auricle was called the Sinus of the Venal Arteries, & the two little fleshy Appendages to the Auricles were by them called the Auricles, or little Ears from their supposed resemblance to the Ears of some Animals. The Use of these Appendages seems only to be to fill up the Vacant Spaces, that the Heart may lie close, & compact in the Pericardium – the Heart must be always injected in its Pericardium, that it may keep to its proper figure when distended – the Ascending & Descending Vena Cava enter the right Auricle in an inclined direction to one Another, so as both to direct their blood toward the middle of the Cavity making an Eminence called Tuberculum Loweri; the great Coronary Vein enters the underside of this Auricle, the sides of the Auricle are every where thin, tho' in some parts thicker than in others

It may

The Heart

It may be ask'd what prevents the blood from regurgitating into the Vena
Cava Superior when the Auricle contracts, as there is no Valve there; Dr Hunter
supposes, that the Muscular fibres first begin to contract there & by that means
serve the purpose of One; tho' there may be a little regurgitation. In the Cava
Inferior there is a little fold of the inner Coat, called Valvula Nobilis, it certainly
however is not a Valve, for it is often fasciculated like Lace with little perforations
in it; the Muscular fibres here supply the want of a Valve. In the Septum
auricularum immediately below the Tuberculum Loweri is the mark where
the Foramen Ovale was in the Foetus, sometimes it is found open in the Adult.
Between the Cava Inferior & the passage into the Ventricle is the Orifice of the
great Coronary Veine. In that part of this Auricle which is far removed
from the Orifices, the sides are fasciculated like Lace, to churn, & mix the blood
better where there was most danger of its stagnation. This Auricle by its contraction
throws the blood into the right Ventricle, which is a strong Muscular bag, fasci-
culated at its lower part, & has fleshy Pillars going across from side to side.
The Orifice between the Auricle & Ventricle is surrounded by Valves with loose floating
edges projecting into the Ventricles; these are called Valvulae Tricuspides, it is how-
ever but One Membrane continued round with three points, therefore should be
called Valvula Tricuspis. The Pulmonary Artery arises from this Ventricle &
afterwards divides into two branches, one to each Lung; at its beginning are three
Valves, called Valvulae Semilunares, whose loose floating Edges meet One Another
when the blood presses from the Artery, & prevents regurgitation by stopping
up the Artery entirely. This Artery carries the blood (which may be considered
as bad blood) thro' the Lungs to be improved. It is brought back again to
the Heart by the four pulmonary Veins (two from each Lung) which enter the left
Auricle. Upon the Septum Auricularum of this Auricle the remains of the
Foramen Ovale may be seen plainly. The Pulmonary Veins have no Valves
at their Entrance into the Auricle, but we suppose that the Muscular fibres of
the Auricle begin their Contraction at the Orifices of the Veins, so as to shut up their
Cavity

Cavity & prevent regurgitation. The internal Surface of this Auricle is smooth because there being fact streams running into it, the blood should not stagnate. The left Auricle & Ventricle answer to what has been said of the right, only that they are much stronger & the Ventricle goes down almost to the Apex, which the other does not. It was necessary that this Ventricle should be much stronger than the other, because it throws the blood to all parts of the body, while the right only carries it to the Lungs. The Ventricle is finely fasciculated towards the Apex, but where the blood could not possibly stagnate it is smooth: Between the Auricle & Ventricle are placed the Valvula Mitrales, so called from their supposed resemblance of the two sides of a Mitre; properly it is but one Valve, Valvula Mitralis, it produces the Cordae Tendineae that terminate in the Carneae Columnae, which are so situated as to leave as clear a space as possible for the passage of the blood. The Aorta begins at this Ventricle, & has three Semilunar Valves at its beginning like as in the Pulmonary Artery, at the place where the Valves make a middle part with each other is placed a small protuberance on each, call'd the Corpuscu Sesamoidale of Julius Caesar Aurantius

The very first branches that the Aorta gives off are the two Coronary Arteries, the right & left. These appear on the body of the heart, one on each side of the Pulmonary Artery, before they surround it every where except the upper & Anterior part immediately before the beginning of that Artery, & their branches anastamose at the Apex; It was a common Opinion that these Arteries are not filled at the same time, as the others are, because it was thought that the Valves of the Aorta would press on their Orifices & prevent their being filled during the Systole, but the Conjecture is certainly not true. There is but one Principal Coronary Vein, which empties itself into the right Auricle all the Moderns say that little branches of these Veins open into the right Auricle & Ventricle, & in a less degree into the left, & call them the Foramina Thebasii but Dr. Hunter says there are no such in the human Heart. Mr. Cruikshank has seen them in a Bullock's Heart. The Structure of the Heart is undoubtedly muscular. Galen did not allow it to be a muscle! he defines a muscle to be a part that Contracts Voluntarily, and therefore we need not wonder

The Heart

wonder that he disallows its being a Muscle, more especially as he was unacquainted with the Circulation — No one understood how the principal part of the muscular fibres seen in the Heart: in the first place because the branches of the Coronary Vessels intersect them, & secondly the fibres of the right side intermix with those of the left, so that they cannot be traced — The greatest numbers of them are fixed to the Tendinous Ring round the Aorta, they then go down from the Basis & form a kind of Vortex at the Apex, & are lost in the Columnae Carneae — some fibres seem common to both Ventricles, & a great number proper to the left Ventricle. It is quite enough to know that these fibres by their Action diminish the Cavities of the Heart, & shorten it in every sense — The Internal Membrane of the Veins is continued to form the internal Membrane of the Auricle & Ventricle, & so go on to the Artery, and its Doublings make Valves —

The Circulation of the Blood

Lecture 59th

The General Circulation of the Blood has been commonly divided into two; that which goes to all the parts of the body by the Aorta, & returns by the Vena Cava is called the longer Circulation; that which goes to the Lungs by the Pulmonary Artery & returns by the pulmonary Veins is called the lesser Circulation. the Blood cannot be said to have gone the Circulation till it has gone thro' both these; and a man unless he understood both could not be said to know the Circulation —
Galen made out a very plausible Theory which was the Standard of the Antients in their Opinion of the Heart. He supposed that there were three general Fluids in the body of great importance to it; besides several of an inferior nature, as the Saliva, Semen &c. One of which they called the nervous fluid made in the Brain, & carried to all parts by the nerves for Sensation & Motion; the second the Vital Spirit for warmth, made up in the left Ventricle, & carried by the Aorta to all parts, they said it was finer & of a brighter red Colour than Blood; they thought that the Pulmonary Veins convey'd this from the Lungs, & therefore called them Arteries, but seeing that they had Coats like Veins, they named them the Venal Arteries; they thought that a finer part of the blood transuded thro' the Septum Cordis from the right into the left Ventricle; that this fine liquor together with the air brought from the Lungs made the Vital Spirits. The third, the nutritious fluid the Blood, which they supposed to be made by the Liver from the Chyle absorbed from the Intestine by the mesenteric Veins, & carried into it by the Vena Portarum, that the Blood when made was carried out of the Liver by the Hepatic Veins, into the Vena Cava, they supposed that the Hepatic Veins made the Vena Cava above the Liver, which they called the Vena Cava Superior, which was dilated at the Heart into a sinus, that by this the blood went to the Heart to have the finer part percolated from it to make the Vital Fluid, that the Sinus was continued into what we call the Vena Cava

The Circulation of the Blood

Vena Cava Superior, that the blood which did not pass by the Cava Superior nor soak thro' into the left Ventricle was carried by the Pulmonary Artery (which they called a Vein) to the Lungs for their nourishment, they supposed that the Vena Cava below the Liver carried blood to all the lower parts of the body; they did not suppose that the Blood circulated as we do, but said that it had an Efflux & Reflux, in the Veins almost stagnating — The Circulation of the Blood may be proved in this manner; make a Ligature on a Vein, and it will subside on that side next the heart, & swell on the other side; open it above the Ligature, & it will not bleed; but open it below & it will bleed till more Blood is obtained, than the Limb could contain: this proves that the Blood moves in the Veins towards the Heart, & that they communicate with other Vessels; next make the same experiment on an Artery & the Phenomenon is directly reversed, which proves that the blood in them moves from the Heart towards the Extremities: when a Vein is bleeding stop the Artery by which the blood is carried into that Vein, & the bleeding stops, which clearly proves that the Arteries & Veins communicate — In this manner we trace the blood on to the heart & when there, we find from its Structure that the Blood must of necessity go the round of the Circulation — what puzzled Harvey a little, & was thought to be a strong Argument against the Circulation was this; it was Obser:ved that the Carotid Artery when tied pulsated above the Ligature, & bled if punctured there, so that his Opponents said, that it carried blood down from the Head as well as up to it: but this Objection he soon got over, when he Observed that this happened in consequence of the branches of one Carotid anastomosing with those of the Other — Physicians observing that they had no way of intro:ducing Medicines into the blood but by the Mouth (that by the Skin they had a very confused Idea of) were resolved to try what Effect they would have on the consti:tution when infused immediately in the blood by injecting them in the Veins, accordingly

accordingly it was tried, but it was found that a fluid, which is innocent when taken in the mouth, was exceedingly hurtfull when introduced into the Veins immediately, it was tried on many Animals. — M^r John Hunter found that an infusion of Ipecacuan injected into the Veins of a Dog had the same Effect as if it had been received into the Stomach by the Mouth, & that Olive Oil infused into the Veins of another Dog brought on Suffocation & Death. — A Question was afterwards started, whether there may not be a disease of the fluids alone, or in other words, whether we may not become Old or Diseased by our blood being worn out, or become bad? And if this is the Case, whether Blood transfused from a Young or an Healthy body into us would not make us Young, & healthy again. — Sir Cristopher Wren, M^r Boyle, & D^r Lower took it up Keenly, and experiments were made on many different Animals, & it was thought to succeed, but was soon after laid aside, for what Reason is not certainly known; When D^r Harvey published his Account of the Circulation, it was very much opposed, & ill treated, but the more benevolent People gradually Came into his doctrine, & yet would not Allow him to be the Discoverer, for said they, Hippocrates, & others of the Ancients knew it, & made very trifling quotations with a View to support their illnatured Assertions; But it is certain that Hippocrates & all the Greek Writers were ignorant of it. — Leaving those who were more Ancient we come down to Servetus, who was born at Villeneuve in the Year 1509, & therefore he call'd himself Villenovanus, in 1531 he published a little Treatise de Trinitatis Erroribus, & some Years after he came to Paris & studied Anatomy under Fernelius, & was the immediate Successor of Vesalius, in the year 1540 he settled as a Physician at Lyons, but his inclinations leading him more to the Study of Divinity, than Physic, he lived principally by the Booksellers at Lyons; His Death was brought on by Calvin, & his Adherents, & 1553 he was burnt at Geneva, on account of the Errors he was said to have Advanced in his Theological Treatises, He was accused by Calvin of not Only being an Heretick, but an illiterate & immoral man, but Gonterius says (calling him Nicholas Villinovanus) that he was both a learned

The Circulation of the Blood

learned & a good man & in treating of the Divinity of the three Persons in the Trinity in his book de Trinitatis erroribus, he recollected the three humours of the body, & used them by way of simile, and as he proceeds his Words plainly shew us, that he understood the Circulation of the Blood thro' the Lungs as Harvey afterwards made it out to be, but he did not know the other Circulation — Some have given the discovery of the Circulation to Vesalius, others to Columbus, but they knew no more of it than Servetus had told them — Cesalpinus knew the Circulation from the Aorta to the Vena Cava, for he said that Compression on the Vessels proved it, but he had a very confused Idea of the Circulation in the Head, for he said that the Blood was sometimes carried up there by the Arteries, & down by the Veins, and sometimes vice versa, & that in Sleep the Circulation was either languid, or ceased altogether — It is wonderful therefore from what Servetus & Cesalpinus had said, that no Person made out the Circulation before Harvey's time — the thought does not appear to have arisen in any Person's mind, but Servetus, Cesalpinus, & Harvey's — Harvey says he was led to think of it from observing the Valves in the Veins ———

The Circulation of the Blood

Lecture 60th

With regard to the beginning of the Circulation Dr Harvey, who observed the progress of the Chick in the incubated Egg, supposed that the Blood was formed before the Heart, or any thing else; that it was the primum vivens, & that it stimulated the Heart to begin its Action, but he had not the help of Glasses – Malpighi inspected the incubated Egg with Microscopes; he saw the rudiments of the Chick before there was any appearance of red blood, but could not determine which was the first appearance of Life – With regard to the end of the Circulation Dr Harvey thought there was Motion in the Blood after the heart had ceased to Act, & that the immed:iate cause of the Hearts Motion was the Stimulus of the Warm blood – Haller opened the Chest of a Dog & observed that the left Ventricle died first, then the left Auricle, then the right Ventricle, & lastly the right Auricle; and he found that by tying the Vena Cava, & thus intercepting the blood, he could make the right Ventricle, & Auricle die first of All – Much has been said about the force of the Heart, that is, what is commonly meant the force of the left Ventricle – Mathematicians have differed greatly in their Computations for want of Data to reason on – Borelli determined it to be equal to 135000 pound weight, and Keill by taking the best Data he could, made it equal to ℥viij – Dr Jurin after them took it up, he said that both were in the Wrong, & that it was wrong to make it equal to such weight, that we ought to say it is equal to a body of such a Weight moving with such a Velo:city in a given time, & therefore he makes it equal to nine pounds one ounce moving with the Velocity of an Inch in a second of time – It is plain that Borelli in making it equal to so Many thousand Pounds Weight had erred, for the Valves between the Auricle & Ventricle could not have withstood it – When a Childs navel string drops of itself, it is a very rare Case that an Hæmorrhage ensues, but after Death by injecting

the Aorta

the Aorta some of the injection is easily forced out at the navel, a proof that the action of the Heart in the living body is not considerable — Various Calculations have been made of the quantity of blood in a body, — By Blood we mean all that fluid which has circulated thro' the Heart, — Dr Martin supposes, that a body weighing 160 pounds contained 100 pounds of blood, but there does not appear to be any possible means of determining it, for if we bleed Animals to death, we cannot be supposed to get out all the blood — The [illegible] dropsy of the muscles depends on the blood — It is the common Opin:ion that the Heart is active in Contraction, & passive in Dilatation, but it appears that there is something active in the Diastole as well as in the Systole, for if a Circular piece of a Turtle's heart be cut off, it will both dilate & contract itself after the blood is removed. — Some have endeavoured to account for the pulsation of the Heart against the Ribs by supposing that the muscular fibres of the Heart run in the form of the Figure 8, — that in the Systole there was a twisting or lengthening of the fibres; for said they, if at the Systole the Heart contracts in all its parts from the Apex to the Basis, it must be drawn from the Ribs instead of beating against them. The reason is this, the Aorta is at the beginning curved: the force with which the blood is thrown from the Heart tends to straighten the Artery by striking against its sides, this it can't do, because the Artery is fixed by the Spine, & therefore the Heart recoils with a Jerk; when a Person is sitting quite still with one knee across the other, we can see the foot move at each pulsation of the Arteries from the blood endeavouring to run in a straight line, & the motion will be more manifest in proportion as the action of the heart is stronger. — The Proportion between the quantity of blood capable of being contained in the right, & the quantity capable of being contained in the left side, of the heart cannot be determined. For in the first place, where do the Veins terminate? It is the general Opinion that the right side is smaller than the left, tho' it is plain the same quantity of blood must pass thro' each, neither can we determine the proportion between the Auricle & the Ventricle, because we can't draw the Line of

partition

partition between them with any certainty; by the Valve Haller imagines that the Heart contracts so as to squeeze out every drop of blood, & that the Carnea Columna fall into the Vacant Spaces. Harvey & almost every body Else supposed that the two Ventricles acted together; if so, the Auricles & Arteries must of course do the same; that the Contraction of the Auricle makes the Dilatation of the Ventricle, & the Contraction of the Ventricle makes the Dilatation of the Artery, so that the Auricle & the Arteries act together. Dr Nicholls thinks that the Auricle, Ventricle & Artery on the right side are contracted at the same time that the Auricle Ventricle & Artery are swelled on the left side, and alternately first the Auricle, then the Ventricle, and then the Artery.

Dr Hunter has not a doubt of Harvey's being in the right; for he opened a live Cat & made a little puncture in each Ventricle, thro' which he observed the blood to come at the same Instant. This he told to Dr Nicholls, but the Dr said that the right Ventricle being thin, the blood would come out at the puncture as out of a hole in the bladder, & that the left Ventricle being thick the muscular fibres would contract the Orifice of the puncture, & act as a Valve when they were contracting in their Systole, and that it was at the time of their Relaxation that the blood would come thro', so that the blood would come thro' from the right Ventricle at the Systole, & from the left Ventricle in the Diastole. Dr Hunter then repeated the experiment by thrusting two small Trocars, one into each Ventricle, & then the Perforations being withdrawn & the Canula left in, the blood came thro' both the Canula at the same time during the Systole. As the Office of the Heart is so important, it cannot sustain great Diseases. Adhesions between it & the Pericardium are very frequent which may probably be the Cause of Palpitation, & those little irregularities in the Pulse which we sometimes meet with. We sometimes find too great a quantity of Liquor in the Pericardium, & frequently the Valves of the Heart are found partly ossified. In those who expire almost instantaneously, the Cause is commonly in the Heart, or some of its principal Vessels, tho' it has been generally supposed that they died from a disease of the Brain.

The Spleen is often found inflamed, & sometimes suppurated, which was the case with the late Lord Middleton & Dr Pate. Both complained of great Pain, & yet it was very extraordinary, neither of them could describe the seat of their pain,

tho' at

tho' at times it was exceeding violent as to make them cry out most vehemently. Sometimes it is found shrivelled up almost to nothing, & sometimes is greatly enlarged, yet often returns to its natural size. A Woman after Delivery had such a fullness & hardness at the bottom of the Abdomen, that she was thought to have another Child within her, but by examining the Uterus with a probe it was found contracted, so that there could be no other Child remaining. The Woman died & upon opening the body, the Spleen was found greatly enlarged, & had changed its situation, so as to give the appearance of a Child in Utero when the Abdomen was examined. That thing call'd an Ague Cake is supposed to be an indurated Spleen, but D^r Hunter could never get an opportunity to dissect one who died of this Disease. The **Pancreas** seems to be the part the most seldom diseased of any other in the body. D^r Hunter has known an Enlarged & Scirrhous Pancreas the Cause of a Jaundice by its pressing on the Ductus Communis Choledochus, & M^r John Hunter once found the Pancreatic Duct greatly distended, & full of hard white Concretions. The **Liver** is often found inflamed, & adhering to the neighbouring parts, sometimes it suppurates, but the Pus is always of a Bloody Liver colour. It is often found full of little Spots & Tubercles, & small collections of Pus interspersed thro' it. Cysts of a peculiar nature are frequently found in the Liver; these bags which sometimes contain Water, sometimes Hydatids; often the bag is lined with a Gelatinous Membrane, & there is then Only One Hydatid, sometimes it contains hundreds of Hydatids. By an Hydatid we mean a body detached all round, commonly swimming in Water, sometimes containing Water, at other times they appear flattened & Gelatinous; there is no Appearance of Vessels, or Organization in their Texture, yet some of the Antients and Moderns have supposed them to be Worms. When these Cysts are situated on the back part of the Liver, they infallibly destroy the Patient; if on the fore part, they sometimes point outwards & burst, but they generally prove fatal.

Lect 61^st

The Arteries

Lecture 61st

We take the Arteries first, & then the Veins, & because of removing them to come at the Aorta — We take first the Arteries of the loose Abdominal Viscera

The Aorta between the Diaphragm, & the Bifurcation of the Iliacs gives off three Azygos Arteries — Just as it comes from under the Diaphragm it gives off the Celiac, to the Stomach, Liver, Spleen, & Pancreas, then the Superior Mes:enteric principally to the small Intestines, & then the Inferior Mesenteric prin:cipally to the large Intestines: The Celiac is the largest of the three; the Inferior Mesenteric is the smallest — The Celiac gives off the Coronary to the Stomach, the Hepatic to the Liver, & the Splenic Artery, which running along the upper part of the Pancreas to the Spleen, gives off the Vasa brevia to the Stomach; Immediate:ly above the Emulgents the Superior Mesenteric arises, & the Duodenum passes under its Trunk, at what is called the root of the Mesentery: It gives off branches every where to the Mesentery as far as the Termination of the Ileum, & partly to the great Arch of the Colon: these branches anastamose very freely on the Mesentery, & then send straight branches to the Intestines The principal branch of the Inferior Mesenteric Artery goes down Obliquely on the left side along with the Sigmoid flexure of the Colon behind the Rectum quite down to the Anus: the other branch runs to the right side, & is distributed chiefly to the Mesocolon: These are the Arteries serving the loose Abdominal Viscera —

The Aorta gives off, first the two Coronary Arteries, & then very small bran:ches to the middle part of the Chest, the Thymus Gland, Mediastinum &c From the upper part of the Curvature go off three branches, first the right Carot:id, which soon gives off the right Subclavian; secondly the left Carotid, and thirdly the left Subclavian — The branches of the Carotids run in the same direc:tion, on each side the Carotid runs up close to the Vertebra, near to, but rather behind the Trachea Arteria & Oesophagus — It runs the farthest of any

Artery

Artery in the body without branching, at the upper part of the Larynx it divides into two branches, the external and Internal Carotid, so named not from their situation, but from the parts to which they are distributed. — The External Carotid soon divides into many branches, the first which goes off is the Superior Guttural, which carries an amazing quantity of blood to the Thyroid Gland; but for what purpose is not known, it also distributes some blood to the Tongue, & neighbouring parts, the next branch is the Inferior Guttural. the next branch is the Genal, which mounts over the lower Jaw, & Buccinator Muscle to the side of the Nose, & gives off a pretty considerable branch to the upper & lower Lip: this Artery runs in a Serpentine direction as do all those which run over parts liable to be stretched. — The next Branch, or rather the Trunk of the External Carotid Artery, runs up behind the Parotid Gland, & the lower Jaw, & emerges just before the Ear, mounts upon the Temple, & then divides into two principal branches, which distribute the blood to the neighbouring parts; In its way to the Temple it gives off a branch inwards, the internal Maxillary of the upper Jaw, from which goes the Inferior Maxillary down to the Canal in the lower Jaw to go thro' that along with the Nerve; it gives off also another little branch which goes thro' an hole in the Basis of the Skull to the Dura Mater, the Artery of the Dura Mater

The Arteries

Lecture 62d

The Internal Carotid enters the Skull at the Anterior point of the Temporal Bone passes upwards, gets upon the Os Sphanoides to the Sella Turcica on the inside of the Optic nerve, where it sends off a branch to the Orbit, it pierces the Dura Mater, & gives branches thro' all the Contents of the Skull

Arteriotomy has been supposed to be of greater service than Phlebotomy in Some local Complaints, particularly in Diseases of the head — The Temporal Artery is commonly chosen for this purpose, it is difficult to open it in the same manner as we do a Vein, because it is so small, & therefore we are advised to cut it transversely: if the Artery is quite divided, it commonly bleeds impetuously, till about a Teacup full is evacuated, then it shrinks & stops suddenly, & if it is not quite divided, it is sometimes difficult to stop the Hæmorrhage — It has been recommended to cut the Artery coming from the internal Carotid at the Sella Turcica, where it passes thro the Superciliary Notch at the upper part of the Orbit; but as we cannot avoid cutting some small Twigs of the Nerves which go to the Scalp along with it, & as the Bleeding will often stop before the due quantity is obtained it will be better to omit bleeding here entirely — The Subclavian Artery comes off from the Carotid; it passes before the transverse process of the last Vertebra Colli, gets into the hole of the transverse process of the lowest but one of the Vertebra Colli, then runs up all the holes of the Superior Vetebra Colli, when it has passed thro' the Dentata it makes a turn outwards to pass thro' the Atlas, which projects considerably from the Other transverse Processes, from hence it turns backwards & gets thro' the Foramen Magnum Occipitale into the Skull, then it pierces the Dura Mater upwards & forwards to the Pons Varolii, where it joins with its fellow, & they two become one Trunk, call'd the Basillary Artery, which again divides into two branches that anastamose with the posterior branches of the Internal Carotid: the Anterior branches of the internal Carotid join by a Canal before, & laterally they anastamose with the posterior branches, so that there is an anastamosis all round the Sella Turcica — Some have said that the Arteries

which go

The Arteries

which go to the side of the Skull, especially the Vertebral, take their twists to break the force of the blood before it gets to the Brain: but these twists & turns in the Vertebral Artery seem to be no more than was necessary for their situation & the rotation of the head, & not to break the Impetus of the blood — In the internal Carotid it seems more probable that it is to break the Impetus. There is no doubt but that all Arteries carry the same mixed mass of Blood from the frequent Anastamoses that we observe — The Axillary Artery runs under the Tendons of the Pectoralis & Coracobrachialis, & short head of the Biceps on the inside of the Os Humerus, & is then call'd the Brachial, or Humeral Artery, & gradually gets to the forepart upon the Brachiaeus Internus, & commonly remains one whole Trunk till it gets below the bend of the Arm, frequently however it divides before it gets there, sometimes it divides as high up as the axilla; but then the two branches run close together commonly, one immedia-tely above the other, till they have pass'd the bend of the Arm, when they separate one running more superficial call'd the Radial; the other much deeper call'd the Ulnar Artery — The Radial Artery runs close before the Radius, it sends off a branch which runs up behind the outer Condyle of the humerus, & anastamoses with other very little branches that come down from the Trunk above the bend of the Arm — The Ulnar Artery too throws off a branch upwards, & behind the inner Condyle that anastamoses with small branches which come down from the Trunk above the bend — By means of these Anastamosing branches the Circulation is kept up after the Trunk has been tied in the Operation for the Aneurism, or puncture of the Artery in bleeding; both these branches come off nearly at the same part of the Arm, that is, from the upper part of the Ulnar & Radial Artery below the bend — Even if these branches should be wanting, yet we must consider the flesh of all parts of the body as compos'd of Vessels Anastamosing with each other, & by this means the Limb would be nourished; tho' the Vessels might be so small as not to be traced by Injections — The Ulnar Artery runs deep under the muscles close before the Ulna, & passes close to the Pisiform bone on the inside into the palm of the Hand

The Arteries

Hand, & at its upper part it gives off the interosseus Artery, which runs between the two bones, & supplies the parts thereabouts. — Dr Hunter supposed that in seven Arms out of ten, the Artery does not divide into branches till after it has pass'd the bend of the Arm, & that in seven Patients out of ten that have been injured in bloodletting, the Artery will be found to have ~~been~~ divided before it has reached the bend. — This at first View appears to be an absurdity, but the reason is this when the Artery has divided into two branches before it has reached the bend, the one branch generally lying immediately under the other raises it up, & therefore by its laying more superficial, it is more liable to be injured. — In performing the Operation for the Aneurism care should be taken to observe, whether it is the principal trunk, or not which is wounded, because if it is a branch it should be drawn a little before it is tied, by which means the other branch is left to carry on the Circulation, which otherwise in all probability would have been tied along with it: when only a branch is tied a pulse may be felt in the Wrist imme-diately after the Operation, but when the principal Trunk is tied no pulse is felt till after four or five days, when the anastamosing Vessels gradually distend, & bring more blood, a weak pulse becomes sensible to the finger, the numbness gradually goes off & in a Month's time a pretty good pulse may be felt; — the anastamosing branches are dilated very much by the great quantity of blood that is obliged to pass thro' them, so that from very small they become very considerable Arteries, & being lengthned as well as dilated they become tortuous.

This is a very conspicuous Anastamosis. But besides this the flesh of the Body contains most numerous Anastamoses every where ———

The Arteries

Lecture 63d

The Radial Artery at the Carpus divides into two branches, the largest passes outw:
:ard under the two Tendons of the Flexor Primi, & Secundi Internodii Pollicis, goes
thro' the Angle between the first bone of the Thumb & Metacarpal of the first finger,
& in this manner it gets from behind into the palm of the hand before. ~~The Thum~~
Thumb & Fingers have an Artery on each side the Flexor Tendons, which run the
whole length of the fingers, they are branches from the Ulnar, & Radial Arteries.
when any of the large branches in the palm of the Hand are wounded, compression
alone is not sufficient to stop the hæmorrhage because of the numerous Anast:
:amoses. In taking off the Arm at the Shoulder joint, we cut thro' the Pectora:
:lis, the short head of the Biceps, & Coraco-brachialis, then we find the Artery
close to the inside of the Os Humeri; it will often happen that the Artery will be
tyed just below, where it gives off a considerable branch to the neighbouring Mus:
:cles, & other parts about the joint: In dissecting out the head of the bone we shall
necessarily divide the branch, which will cause a considerable gush of blood,
& might make the Surgeon suspect, he had wounded the Trunk itself. It must
be secured with a Ligature. The Bronchial Arteries arise from the fore part
of the Descending Aorta, sometimes by one common Trunk, but most commonly
by two. The Intercostals are generally one to each Rib: they come from the
back part of the Aorta, & run along the lower edge of the Ribs, sometimes one Inter:
:costal serves two Ribs by dividing into two branches: the first & second Ribs
have generally their Intercostals from the Subclavian. The Aorta lying on the
left side the spine rather covers the left Intercostals. The Phrenic Artery
(to the Diaphragm) generally arises distinct from the Aorta, sometimes however
along with the Celiac. The Aorta in its passage downward gives off also the
Emulgent to the Kidneys, the Spermatics to the Testes, & the Lumbar Arteries; just
as it reaches the last Vertebra Lumborum it divides into two branches, the
Iliac Arteries, & at the very Angle of the Bifurcation arises an Azygos Artery
the Sacral Artery. The Iliac Artery goes in the straitest direction it can along

the projecting

The Arteries

the projecting fleshy brim of the Pelvis, & passes under Poupart's Ligament into the forepart of the Thigh: at the upper part of the Os Sacrum, the Iliac Artery divides into two, the external & internal Iliac — The external is what passes under Poupart's Ligament, & makes the great Crural Artery — the internal Iliac passes down into the Pelvis & is call'd the Hypogastric Artery: under Poupart's Ligament the external Iliac sends off two branches, the one nameless, the other the Epigastric Artery which is reflected upwards on the inside of the Rectus Mus-cle — The Intestine in a Femoral Rupture sometimes passes down to the forepart of the Thigh under Poupart's Ligament on the inside of the Epigastric artery — In the Operation then if we cut upwards & inwards we shall cut the Spermatic Artery if it is a Male, if we cut upwards & outwards we shall cut the Epigastric Artery; if the Intestine should have passed down on the outside of the Epigastric Artery, if we cut upwards & outwards we shall then avoid both Arteries — The Obturator Artery is a branch from the

— many large branches pass thro' the Sciatic Notch to the adjacent parts — The External Iliac is larger than the Internal in the Adult (adult in opposition to Fœtus) in the Fœtus it is the very reverse — in the Fœtus the Internal Iliac after having given off the Hypogastric branches principally to the Uterus & Vagina in the Female & to the bladder & Vesiculæ Seminales in the Male, makes a turn forwards, passes up on the side of the Bladder & gets to the navel making the Umbilical Artery one on each side; In the Adult all except so far as it is continued along the side of the bladder, & branches off, degenerates into a Ligament: so that what was at birth a Canal from the Pelvis to the navel remains so after birth no farther than the bladder; all between the Bladder & navel is then impervious —

Lect 64th

The Arteries

Lecture 64th

Underneath Pouparts Ligament the Artery is on the outside of the Vein; both together lie in the middle place between the projection of the Os Pubis, & the projection of the Anterior part of the Spine of the Os Ilium: from Pouparts Ligament the Artery runs down in the straitest possible course to get between the two Condyles behind, & in its way it passes thro' the Tendon of the Triceps muscle, a little below the middle of the Thigh; where it lies in the Ham it is called the Popliteal Artery: just as it passes out of the Ham between the two attachments of the Soleus it sends off the Anterior Tibial Artery which passes immediately thro' between the two bones to the fore part of the Leg; soon after it has sent off this branch it divides into the posterior Tibial & the Fibular or Peroneal Artery: the Anterior Tibial runs down the forepart of the Leg deep seated between the bones, & close to the Tibia, gets to the back of the foot, & then plunges in between the Metatarsal bones of the first & second Toe. The posterior Tibial runs down behind the Tibia deeply seated between the muscles that make the Tendo Achillis & those that lie immediately close to the bones: it runs behind the inner Ancle & on the inside of the Os Calcis where it divides into the Plantaris Internus & Externus, the one to the inner, the other to the outer side of the Sole of the foot: just above the Ancle it sends off a branch which gets from behind to the forepart of the foot by passing between the Tibia & Fibula, and anastamoses with the Anterior Tibial, & the Fibular Artery runs deeply seated close down behind the Fibula & passes behind the outer Ancle to the outside of the Foot, above the Ancle it sends off a branch forwards round the Fibula, which anastamoses with the Anterior Tibial. —

The Anterior & posterior Tibial anastamose together, & send branches along the sides of each Toe to the very End, as the Radial & Ulnar Arteries do in the Hand

By knowing

The Veins

By knowing the Course of the Arteries we pretty well know the Course of the Veins, but there may be said to be two sets of Veins, the One taking the Course of the Arteries, the other laying quite superficial without any Large arteries near them. From considering the Veins Physiologically we only learn that they return the blood to the Heart. Wounds of the Veins are not nearly so dangerous as those of the Arteries. When a large Vein is tied the Circulation is continued by means of the communicating branches. The Anast: =amoses of the Venal System is oddly more numerous & considerable than of the arterial System. A man at Manchester cut his large Crural Artery about the middle, on account of the bleeding from the Anastamosing branches it was necessary to tye it immediately without endeavouring to seperate it from the Vein, so that this Artery & the great Vein were tyed together: the man did well, the blood was carried thro' the Limb by the Anastamosing Arteries, and was returned by the Anastamosing Superficial Veins, which became exc: =ceedingly turgid & tortuous, and made the Appearance of the Limb very different from the other: the Vena Saphana quite from the Foot to the upper part of the Thigh was very prominent & winding. The Veins (except those of the Viscera) have Valves, in which they differ from Arteries. The Plexuses of Veins in different parts of the body are in no two persons alike. The Vena Azygos arises from the Vena Cava Superior, & may be said to be the Drain of Blood from all the containing parts of the Chest: it gives off lateral branches answering to the Intercostal Arteries, soon after the Vena Cava Superior divides into the two Subclavians, and as it lies on the right side of the Spine the left Subclavian is longest. The great Vein from the Thyroid Gland enters the left Subclavian immediately in the middle of the body: Each Subclavian before it passes over the first Rib gives off the Trunks of the External and Internal Jugular Veins. The external branches commonly attend the external branches of the

Carotid

The Veins

Carotid Artery, and the internal Jugular passes into the Skull with the internal Carotid, & forms the Sinuses of the Dura Mater: at the Shoulder the Subclavian sends off the Cephalic Vein, which comes out between the Deltoid & Pectoral Muscles, and runs down the Arm immediately under the Skin; the continuation of the Subclavian goes down the Arm along with the Artery & is called the Basilic; at the bend of the Arm the Veins divide & anastamose making four principal Ones, the Cephalic, the Cephalic Median, the Basilic Median, & the continuation of the Basilic — The Ulnar Vein, the Cephalic & Basilic Medians unite a little below the bend. — The Basilic Median is commonly the most turgid, & superficial for bleeding, yet as it lies immediately on the Fascia and Artery, the Surgeon commonly chuses to take the next Superficial One, the Cephalic Median, if this cannot be got, there is the Cephalic which fills very well, & rises superficially, but its Situation is aukward, and being a small rolling Vein, it easily eludes the Lancet — There is no Objection to opening the Ulnar Vein, but the aukwardness of its Situation, it laying too much underneath the Arm to be conveniently come at — (when a Vein is opened with a blunt Lancet, the Lancet first presses all the parts together, and then the Plunge makes the Lancet go deeper than was intended.) — The Veins of the Arm divide & subdivide down the fore Arm, and hand, passing from before round the Outside of the Ulna, and Radius to the back part of the Arm and Hand — Every Artery is commonly attended by two Veins —

The Vena Cava Inferior gives off no branches similar to the Celiac, and two Mesenteric Arteries: but the blood returning from the Stomach, Spleen, Pancreas and Intestines is carried by the Vena Portarum into the Liver: the Blood is carried from the Liver into the Vena Cava Inferior, by the Vena Cava Hepatica, which enters it just under the Diaphragm —

Each

The Veins

Each of the Iliac Veins divide into an External, which passes under Pouparts Ligament, and an Internal one, going down into the Pelvis. called the Hypogastric Vein, which is distributed to the internal parts of Generation. just under Pouparts Ligament the Vein sends off the Vena Saphaena, which runs along the inside of the thigh and Leg from the Groin to the Foot, all the way immediately under the Skin: it divides, and Anastamoses on the upper part of the Foot, as the Veins do on the back of the hand: Opening any of these Veins in the Foot is called Bleeding in the Vena Saphaena —

— The Continuation of the Iliac Vein the Crural takes the Course of the Crural Artery ——

The Brain

Lecture 65th

The whole brain may be said to be that Substance from which the nerves are produced, it naturally divides itself into two parts, that within the Skull called Encephalon is Oviform, & the back part is situated much lower than the fore part. it is divided into three principal parts, the Cerebrum, Cerebellum, & Medulla oblongata from whence the Medulla Spinalis originates. The Falciform process of the Dura Mater above divides the Cerebrum into two equal Hemispheres. The Cerebrum projects before at the forehead, & makes the Anterior Lobe Cerebri; it projects behind & makes the Posterior Lobes, & it projects laterally on the Temporal bones towards the Basis of the Skull & makes the middle Lobes Cerebri. The Cerebrum reaches from the forehead to the most projecting part of the hind head above; below it reaches no farther than the transverse ridge by the Pars Petrosa of the Temporal Bone at the Basis of the Skull; at the Pars Petrosa the Cerebellum begins, and lies under & behind the Cerebrum. The External Line opposite to the division between the Cerebrum & Cerebellum is a very little lower than the transverse Ridge on the Occipital bone; the Posterior part of the Falciform Process splits into two & runs transversely betw:een the posterior Lobes Cerebri & the Cerebellum. These are called the Lateral Processes, they do not meet at their inner edges so as to divide the Cerebrum & Cerebellum asunder from One Another, but they are continued only to a certain depth, & leave a middle common part between them called the Isthmus.

The Dura Mater is a Tendinous Membrane made of two Lamina, not to be separated however except just at the Sinuses, it is chiefly connected to All the internal Surface of the Cranium by very minute blood Vessels, which pass from One to the Other, its inner Surface is smooth & polished, & its Vessels project on the external Surface, and so necessarily lay in Cavities in the bone

The Brain

Bone; except at the Sinuses it has no connection with the Pia Mater, very {illegible} vessels. the Space between them may be considered as a cavity, & a teaspoonful of fluid between the two will spread itself half over the Brain, because they lie naturally in close contact, its principal Artery is a branch from the External Carotid that enters the Skull just before the Temporal Bone at the lower Anterior angle of the Parietal Bone; this branches every where thro' it, & upon every Branch of an Artery attend two branches of Veins, one on each side of the Artery. all along the upper edge, of the Falciform Process the superior longitudinal Sinus runs, it is made by the splitting of the inner Lamella of the Dura Mater, which runs down between the Hemispheres, while the external Lamella going straight leaves a triangular Space, between which is the Superior longitudinal Sinus. The Dura & Pia Mater adhere at the Sinuses because the Veins of both enter into them. This Adhesion prevents any fluid from getting across the Sinus from one side to the other. The Sinuses may be considered as vacant Spaces between the two Lamella of the Dura Mater & are Veins ex Officio. These Spaces are triangular, full of Orifices of Veins, that open into them. The Superior longitudinal Sinus is broadest behind, the Stream of blood thro' it runs backwards, the Veins open into it forward, so that the two Streams meet, why this is so we dont know; it has bridles going across it made by small processes of the inner part of the Dura Mater (which are washed on both sides by the Blood in the Sinus) as if there was danger of its being too much distended; it begins forwards at the Crysta Galli, it runs backwards under the Superior middle part of the Arch of the Cranium till it gets to the Cerebellum here it divides into the two lateral Sinuses, which run as far as the Temporal Bone between the Cerebrum and Cerebellum, and there form the Jugular Vein on each side. These three Sinuses drain the two Membranes, and the

Exterior

Exterior part of the Brain of their Venal Blood; the middle mass of Brain is drained by a fourth Sinus, the Torcular Hierophyli, or press of Hierophylus, it opens into the cross way between the longitudinal and lateral Sinuses, some:times to the right, & sometimes to the left lateral ~ modern Anatomists describe many more Sinuses, at least eight or ten, as the inferior longitudinal that runs along the inferior edge of the Falx, the Frontal, the Sphenoidal &c. These are only Veins in the Dura mater, that open into the four Triangular Sinus: :ses already described; and we may trace at least an hundred of the same kind ~ The Pia mater gives to the Brain a smooth outward Covering it may be considered as made of two Lamellæ, and the inner One passing down between all the convo:lutions, so that it's internal Surface is exceedingly distended ~ When the Pia mater is on the Brain, the Convolutions are all fixed even to One Another, but when that is stripped off the Convolutions are loose & disunited for some way down, so that the finger may be passed between them for some little depth, for a Process of the Pia mater enters down between, & is fixed to the Convolutions of the brain ~ The Vessels of the Brain are continued on to the Dura mater & Pia mater, and the Vessels that connect the Pia mater to the Convolutions of the Brain are called by Ruysch, Tomentum Cerebri; and indeed when the membrane is stripped off, they have that downy Appearance ~ Anatomists have described a third membrane situated between the Dura & Pia mater, the Tunica Arachno:ides; the appearance of this however is no where to be seen, but down by the medulla oblongata ~ The names which have been given to different parts of the Brain, are ridiculous enough without any regard to their Uses, neither indeed are the Uses of particular parts known, yet it was necessary they should have names, else when we describe particular Cases &c we should not be understood.

understood — To examine the Contents of the Cranium we saw the Skull thro' circularly, when the upper piece is removed the Dura Mater is seen, & immediately under this the Pia Mater: the Vessels at the Falx must be broken thro' with the Finger, and the Falx drawn out & cut off at the Crista Galli — The two Hemispheres being drawn gently asunder at a certain depth the Corpus Callosum is seen, which is a white Substance of a pretty firm texture; all above it is called the Convolutions of the Brain; these Convolutions are to be cut off down to the Corpus Callosum, they are composed of an outer Cortical part of an Ash: colour, & an inner Medullary part of a white colour, the Inner Medullary is greater than the Cortical, it shoots off from the Corpus Callosum as from a Center, into the middle of each Convolution, where it is covered all round by the external Cortical part, which follows in & out the disposition of the Convolutions, so that the Pia Mater touches only the Cortical Substance. Both the Cortical & Medullary Substance are very tender, the Cortical most so, and they are exceedi: ngly vascular, indeed they appear to be a composition of Vessels — The func: tions of the Brain (the best Physiologists are agreed) are not at all understood from any thing we see of its structure — Some French Physiologists have lately thought the Corpus Callosum to be the immediate seat of the Mind or Soul, from observing that Injuries inflicted here are particularly & suddenly fatal in their Effects — The next parts to be examined are the Ventricles of the Brain, which are two Oblong Cavities, One in each Hemisphere lying contiguous & only separated by an exceeding fine Membrane call'd the Septum Lucidum — they are situated immediately under the Corpus Callosum, & their general direction is forwards & backwards — Each Ventricle adapts itself to the Medullary Sub: stance of the Cerebrum, so it is best to consider each as a cavity sending out three Processes; first the Anterior Process which makes a Cavity in the Middle of

the Anterior

the Anterior Lobe Cerebri, a second into the posterior Lobe Cerebri, & a third winding round into the middle Lobe Cerebri. Anatomists mention an Anterior, & posterior Ventricle; by the posterior they mean the middle process, & what Dr Hunter calls the posterior process, they call the Additamendum. Near the outer side of each Ventricle appears an ash coloured long body narrow forwards, & growing broader as it goes backwards, called the Corpora Striata, between these, & rather behind are situated the Thalami Nervorum Opticorum, white bodies one in each Ventricle; & between these appear the Plexus Choroides a network of vessels. These three, the Corpus Striatum, the Thalami Nervorum Opticorum, & the Plexus Choroides lie in each Ventricle; at the bottom of the Ventricles, & under the Septum Lucidum lies the Fornix, a white Substance; It's Root lies forwards, & its two Crura run backwards & outward with the Plexus Choroides, into the middle process of the Ventricles

The Brain

Lecture 66th

To go on with the Dissection of the Brain. the Two posterior Lobes Cerebri being cut out we see the lateral Processes of the Dura Mater covering the Cerebellum. the middle anterior part of the Cerebellum is highest, & runs up to a point where it joins the Cerebrum, this part is called the Isthmus of the Brain: upon this Isthmus immediately in the Center of the Brain is placed the Pineal Gland; from its being Azygos, & situated so Centrically, Des Cartes concluded that it was the immediate residence of the Soul. The Old Anatomists thought that the Fornix made a Covering to the third Ventricle; but it only lies over, for if we remove the Fornix, we do not thereby expose the Ventricle; under the Root of the Fornix, & Thalami Nervorum opticorum, the two lateral processes of the Ventricles communicate with One another so that we never find one Ventricle turgid with a fluid, & the other not. The Iter ad Infundibulum is at the anterior Extremity of the Thalami Nervorum Opticorum just under the Root of the Fornix, & is called the Anterior hole. The Posterior hole is between the posterior extremities of the Thalami, the Anterior is called Anus, the posterior Vulva. The Thalami Nervorum Opticorum where they lie in contact make longitudinal fissures, but a little way down they are closely united; by tearing this this small union, we expose a little longitudinal Azygos Cavity, called the third Ventricle lying backwards & forwards: into its anterior end the anterior hole leads from above; the posterior hole leads into its posterior end; where the Anterior hole is there is a communication between the two lateral Ventricles, and these two with the third, so that all three communicate with the Infundibulum by means of the Iter. The fourth Ventricle lies under, & a little more backward than the Pineal Gland between the Cerebellum, & Medulla Oblongata; it communicates with the third Ventricle by the Aqueduct that runs from the posterior end of the third Ventricle into the anterior end of the fourth; under the Pineal Gland its posterior end is called Calamus Scriptorius. The Irregularities on the Surface of the Cerebellum are called the Lamella, as those on the Cerebrum, are called Convolutions.

the Cerebellum

The Brain

The Cerebellum is covered by the Dura & Pia Mater, & these two membranes are united together only at the Sinus, as on the Cerebrum at the lowest part of the Medulla Oblongata; The Pia Mater splits into two Lamella, the inner One contains the Vessels, & remains united to the adjacent surface of these parts; the Outer Lamella lies loosely on the inner between it & the Dura Mater, and makes the Tunica Arachnoides as it is called without a Vessel to be seen in it. The Dura Mater is continued from the Medulla Oblongata to the Spinal marrow, & makes a kind of Sheath for it. Between the two Carotid Arteries lies the Infundibulum. The upper part of the Medulla Oblongata is thick & called the Pons Varolii; All the Medulla Oblongata is white, & consists of Medullary Sub:stance, except a little ash-colour thro' its middle. By making a Vertical Incision thro' the Cerebellum from the middle of the Medulla Oblongata, we bring out the Arbor Vitæ, which is the Effect of this particular Incision. It shews the disposition of the Medullary substance within, & the Cortical without, the Medullary shooting from the Medulla Oblongata as its Center. When the Medulla Oblongata sends off the Medullary Substance of the Cerebellum, it is called Pedunculus; when it sends off the Medullary Substance of the Cerebrum, it is called Crura. The Nates & Testes are two pair of little Eminences on the Medulla Oblongata; below these are the Corpora Pyramidalia, & Corpora Olivaria. The Infundibulum was supposed to carry down the water of the Brain into the Glandula Pituitaria, which from thence by some means or other got into the Nose, but tho' the Infundibulum depends immediately over the Glandula Pituitaria, yet it does not go into it. The Glandula Pituitaria is a firm oval body,

The Eye

Lecture 67th

The Eye brows serve principally to defend the Eyes from too much Light;
thence we see that People, who have weak Eyes when they walk out in a clear light,
commonly contract their Eye brows. The Eyelids serve as moveable Curtains to
veil the Eyes occasionally; (the other Senses have no Apparatus to prevent their
being affected at all Times.) In easily opening & shutting the Eye, the upper Lid
only seems to move; the under One moves along with it when we shut the
Eye forcibly. The Elevation of the upper Lid is performed by the Eleva:
:tor Palpebra Superioris, which arises from the upper side of the Optic:
:Hole at the bottom of the Orbit, & is spent in the Lid. The Eye Lids
are strengthened in the middle by a Cartilage or Gristle called the Tarsus,
or Ciliary Cartilage. Mr John Hunter is of Opinion that it is entirely
Glandular. It is true it is not much harder than the Glandular Substance
of the Female Breast. The Pores or Ducts of these Glands may be seen
with a Glass standing in a Row just under the edge of the Eye Lids, the mucus
these Glands secrete is a defence to the Tender inner edge of the Eye Lids
against their being hurt by friction from their frequent closing upon each
other. The use of the Eye lashes is to defend the Eyes from any thing that
might otherwise get into them; therefore when Sand is blown up by the
wind, we almost shut our Eyes, & leave them open only just sufficiently
to see our way. Eyes that have lost their Lashes become weak from the freq:
:uency of having hard bodies thrown into them. The Inner membrane of
the upper Lid is called the Tunica Conjunctiva, which is reflected over the
Tunica Albuginea, & is very thin, so that the Whiteness of that Coat is seen thro'
it. The Angle of Reflexion between the two is perpetually changing, as the
Eye, or Eye Lid move; where it covers the Ball it is smooth & without Vessels,

when it

The Eye

where it covers the inside of the Eye Lid it is very Vascular & Villous — A Moat, that is, any thing getting into the Eye as a bit of Dust, will stick generally on the inside of the Upper Eye Lid, for if it lodges upon the Ball, that Eye Lid immediately comes down, & being rougher than the Ball it carries the irritating body along with it, — It appears to be the inside of the Eye lid that is pained more than the Ball, a small bit of Lint on the End of a Probe will commonly take it out; When the Tarsus is thickned, it is pushed outwards, & by that means inverts the Eye lids — The Tendon of the Orbicularis Muscle, that runs from the inner Canthus to the bone of the Nose is call'd the internal Ligament of the Eye lids; from the outer Angle there is a band of firm Cellular Membrane which fixes it to the brim of the Orbit: this call'd the external Ligament — The Glandula Lacrymalis has only of late been known to be the Source of the Tears; the Old Anatomists call'd it the Glandula Innominata, the unknown Gland; it lies in a Cavity within the brim of the Orbit just over the outer Canthus, & has a Concave Surface adapted to the Convexity of the Eye Ball; its ducts are running Obliquely down, & open thro' the inner Membrane of the upper Eye lid, near to the outer Canthus: there are commonly two or three large enough to admit the end of a small bristle, the Tears then are thrown in between the Eye & the Eye:Lids at the outer Canthus, they are carried out from between them at the inner Canthus, so that they wash the Ball all over — Tho' the Lacrymal Gland is but small, yet it occasionally secretes a great quantity of Tears equally from Affection of the mind, or irritation of the Organ — The Caruncula Lacrymalis fills up the inner Angle, & a little way from it on the Edge of the Eye lids are two little projecting parts, one on each lid: upon these is seen the small Orifices of the Puncta Lacrymalia — When the Eye lids are closed the Orifices lie together, & the Puncta are parallel — They terminate in the Sacculus Lacrymalis in such a manner that it is difficult to say, whether by one or by two Orifices, they open

justas

just as they are uniting, & make the figure of the Letter Y without the Stem: the upper end of the Sac lies under the Tendon of the Orbicularis muscle just without a ridge of the bone, and lodged in a small Cavity of the bone. In the Operation of opening the Sac, this ridge should be felt for, and the point of the knife carried down to the bone within the ridge: in doing this there is no Occasion for cutting the Tendon of the Orbicularis, and if we cut thro' this Tendon, we shall cut thro' both Puncta; which will occasion a perpetual Fistula Lacrymalis by Obliterating the passage for the Tears into the nose. The Eye Ball is moved upward, downward, inward & outward by the four Recti muscles, which are fixed at the Edge of the Hole at the bottom of the Orbit round the Optic nerve. Their other Extremities are fixed by Tendons to the Ball, that are lost in the White Coat of the Eye. It is supposed that all these muscles acting together will press the Ball back against the Fat, parts behind, and perhaps also alter the figure of the Eye a little to answer some particular purpose in Vision. The Obliquus Inferior is fixed to the Brim of the Orbit, a little distance from the Saccus Lacrymalis, & is fixed to the Ball a little from & without the Optic nerve. This is Antagonized by the Obliquus Superior called Trochlearis from its Tendon passing thro' the Trochlea at the inner & superior part of the Orbit just with the Brim. It is fixed to the side of the Hole at the bottom of the Orbit, goes thro' the Pulley, then turns back again, & is fixed to the Superior & outer part of the Ball ——————

Lect 6th

The Eye

Lecture 68th

The Eye is as well understood as any part of the body: the figure of the Ball is a Spheroid, but at the Cornea it projects more than the rest, and on the sides where the four Recti muscles are fixed, it is a little flattened — The Optic Nerve is inserted into its posterior part, not exactly in the middle Central part or Axis, but the least in the World to the inside — This Oblique insertion is very great in some Quadrupeds — The Tunica Conjunctiva does not appear to be continued across the Cornea, at least it does not lay loose there, as on the other part of the Eye, but Dr Hunter thinks it is, & says it is plainly to be seen in the Foetus; Ophthalmies seem to prove this to be the Case — Among the Coats of the Eye, Anatomists have described the Tunica Adnata, but there dont appear to be any such Coat — The first proper Coat of the Eye is thick, & contains the other parts as in a Box, its posterior part, and sides are white and Tendinous, its forepart is bright as Glass — The bright part is call'd the Cornea Transparens; the white Tendinous part, the Cornea Opacea, by others the opaque part is call'd the Sclerotica, and the bright part the Cornea; when the Cornea is soaked in Water, it becomes thick and Opaque. — The part where the Sclerotica & Cornea meet, we will for the present call the Boundery — Immedi:ately within the Sclerotica is a thin Vascular Membrane the Choroides — This goes all round, except that at its Anterior part it has a hole called the Pupil; from the Boundary to where it forms the Pupil it is called the Iris — The Iris is perfectly loose, but the Choroides is connected to the Sclerotica by very fine Vessels, piercing from One into the Other: it is of a darker colour behind than wh:ere it approaches towards the Boundary, for here it becomes almost white, it has two Curling Arteries on it, they branch in a Vortical manner, & therefore called by Steno, Vasa Vorticosa: it may be seperated into two Lamella, the

inner of

The Eye

the inner of which was improperly call'd by Ruysch Membrana, or Tunica Ruyschiana. The Iris differs in colour in different bodies; it has two Circles on it call'd the Zones, one next the Boundary, the other at it's inner edge, it is very thin, but by injection appears to be Vascular. The Processus Ciliaris is a Circle of little Processes at the Boundary, which make a ring all round the Crystalline humour they are particularly large in an Ox's Eye; in the human Eye they are but small — When the Eye is minutely injected, the Choroid Coat seems to be nothing but a Plexus of Vessels; This Coat is discontinued opposite to the insertion of the Optic nerve, or rather it makes a hole for the Admission of the nerve. This Spot at the bottom of the Eye is blind, and Rays coming from any Object, and falling here will produce no image; for if three Cards are stuck upon a Wall, the Eye being placed so that the rays coming from the middle one shall fall on this Spot, the outside ones will be seen, and the middle one not, the other Eye remaining shut; The next Coat of the Eye is the Membrana Nigra or Nigrum Pigmentum; it is an exceeding tender Membrane, & is extended with the Choroides & Iris: it is thickest, darkest, and strongest just under the Iris; it's Use is evidently to prevent any Light passing thro' the Iris into the Eye. it is supposed to be of a darker colour, in proportion as the hair of the Animal is Darker. Withinside of all is the Retina Tunica, which is an expansion of the Optic Nerve. Thro' the Center of the Optic nerve passes an Artery which is expanded on the Retina, and in the Fœtus it may be traced going thro' the Vitreous Humour. We cannot trace the Retina farther than near the Boundary, it always is lost before it quite reaches the Crystalline Humour, if it is continued before the Crystalline Humour, it becomes transparent or I five inject the Eye of a Fœtus not more than five or six months Old, we find

The Eye

We find there is no Pupil to be seen, but a Membrane going quite across, called the Membrana Pupillaris very Vascular. Dr Sands was the first Disco:verer of it. In a Child born at the full time, we never see any Appearance of this Membrane, what becomes of it we dont know. Dr Hunter has an Idea that it afterwards forms the Capsula of the Crystalline Humour. The names Iris, Uvea, & Choroides have been much confounded by different Authors; it is plain that the Greeks understood by Uvea what we call the Iris, & by Choroides the part we have called the Boundary. The Humours of the Eye are three, the Crystalline in the Middle, the Aqueous before it, & the Vitreous behind it. If by Humours is meant a fluid, then there is but one Humour, the Aqueous; the other two are of a Gelatinous consistence of which the Crystall:ine is by much the firmest. The Crystalline is placed just behind the Iris, but no ways connected with it: it is Convex before & behind, but it is more so behind (when put into Spirit of Wine it becomes firm & opaque, of a white colour, like the white of an Egg hardned by boiling.) This with the Ciliary Processes make a compleat partition between the Aqueous and Vitreous Humours. The Aqueous Humour possesses the two Chambers of the Eye, By the Anterior Chamber is meant the space between the Cornea & Iris, & by the posterior Chamber the space between the Iris, & the partition made by the Crystalline Humor & the Ciliary Processes. All the space behind the Partition is filled up by the Vitreous Humour. The middle Anterior part of it recives the posterior Convex part of the Crystalline Humour; around the Edge of the Crystalline, the Membrana Nigra is laid, which has furrows indented thereon by the Ciliary Processes. All the Humours in a sound Eye, & in a Young One especially, are perfectly transparent, it is very plain that the Crystalline

The Eye

Crystalline Humour adheres firmly to the Contiguous Surface of the Vitreous and that too by means of its Capsula; for if the Capsula be punctured it will readily seperate, & leave its Capsula upon the Vitreous. The Capsula is Vascular & may be injected. The Crystalline Humour has different degrees of Firmness in different parts, it is pretty hard towards its Outside, but the Middle or Nucleus is very hard & waxey. No one has yet injected the Substance of the Crystalline Humour, many have talked of it, but they seem to have mistaken & called the injected Capsula, the injected Crystalline. It has been said that Albinus injected it, but he himself told Dr Hunter he never had done it, tho' so early as the Year 1734 he had injected the Membrana Pupillaris, and showed a Preparation, & Drawing of it to Dr Hunter. The Vitreous Humour is a very tender Jelly in Appearance, the greatest part of it is certainly water inclosed in a fine Spongy Membrane of a very delicate structure —

The Eye &c

Lecture 69th

The Knowledge of Light is a necessary Introduction to the Physiology of the Eye. Luminous bodies are of two kinds, one that emits from itself as the Sun, a Candle &c; another that emits Light only by reflecting that which falls on it from some other body; thus the Moon emits not its Own, but Light borrowed from the Sun, and a piece of white paper emits Light reflected which fell on it from a Candle. Every part of a Luminous body has rays passing from it in all possible parallel directions. Any Ray passing from Air & falling Obliquely on a Denser Medium as Water will be refracted, & bent more to the perpendicular direction, by passing thro' One that is rarer will be refracted, & bent more from the perpendicular direction if it passed obliquely. The Rays are supposed to be refracted by the Attraction of Matter, hence the denser the Medium the stronger the Attraction; Any Ray falling perpendicularly on the Surfaces of many Media tho' ever so different in Density will not have its direction altered, it will not be refracted in the least. Rays falling on any Surface of a Body that is smooth will be thrown off again or reflected unless that body be a black One: and the Angle of incidence will always have the same Angle of Reflection, that itself has with a Line perpendicular to the Plane of the Reflector & Vice Versa. The Eye is in fact a Camera Obscura and the Focus is at its bottom, for if we carefully dissect off the Coats at the bottom of an Eye so as not to disturb the Humours, & then lay a piece of transparent bladder in their place, we shall see distinctly the pincture of the opposite Objects shining thro' the bladder. The Crystalline Humour is the principal Refractor, that makes the picture at the bottom of the Eye, that is the point to which it refracts, and converges them. All parts of the Crystalline Humour dont seem to refract equally, but more those Rays that

pass thro'

pass through its Center, than those thro' its Circumference. The Retina appears plainly to be a continuation of the Optic Nerve, and that is the Organ of Vision, and not the Choroides, which is unfit for this purpose because it is covered within by the Black Membrane. Between the Retina & Crystalline Humour there is a space thence to be filled up, & this is done by the Vitreous Humour, which refracting a little there is a double refraction. The Pupil moderates the quantity of Light by its Contraction, and dilates that a greater quantity may be admitted into the Eye when we look at very ~~distinct~~ distant Objects. This seems to be at least one use of the Iris, and that it might perform its Motion properly it plays in an Open Space, which is filled up by a transparent Water. The Use of the Nigrum Pigmentum is to absorb & prevent any Rays passing into the Eye, but such as pass thro' the Crystalline. This black Membrane is laid all round within the Bulb of the Eye for the same reason that a Camera Obscura is painted black within. The Use of the Tunica Choroides is certainly to nourish the Eye. The external Coat the Sclerotica forms the Box or Walls of this tender Organization: its being transparent on the forepart is undoubtedly to admit the Light to the bottom of the Eye, & the transparent part being continued over the Iris allows those very Oblique Rays that fall thereon to be refracted, & by that Means Objects on each side are seen, but not so distinctly as those directly Opposite. The Sclerotica is Tendinous, because Nature could not have given a stronger Coat than a Tendon, & Tendon being inelastic, & the Humours incompressible; pressure on the Eye will not make it deviate from its Spherical figure. The great use of having two Eyes is, that we may judge of distances. We judge of distances by the Angle made by the axis of our two Eyes inclining towards One another. When the Eyes are

directed

directed to a near Object, the Angle is greater, when to a distant Object the angle is less: when we look at very distant Objects, the Axises are nearly parallel. If we shut One Eye we cannot see so as to judge of distance by the Other, because a Single Axis can make no Angle of itself. The Refracting Power of an Old Eye is weak, and therefore an Old Man holds the Object at a distance if in a great Light to make the Rays come to the Eye as parallel as possible that they may not diverge too much before they get to the Retina, so that he wears Convex Spectacles to make the Rays converge. People in this state are long-sighted, and cannot see an Object near them. A Purblind or Short-sighted man has the Rays too much refracted, or converging, and therefore he uses concave Spectacles to diverge the Rays: if he looks at a Distant Object the Rays coming nearly parallel are converged too soon, so that the picture is indistinctly marked on the Retina, and therefore he places the Object near him to adapt the Rays to the great Refraction.

It is well known that the Pupil dilates or contracts as we look at distant or near Objects, but Dr Hunter believes also that the figure of the Ball is altered, and adapted by its muscles to different Objects. A Person, who squints habitually, sees single Objects that present themselves; One, who squints on purpose, and not from Habit sees doubly; and an habitual squinting Person's Eyes when brought right see double: A Child newly born often squints, and feeling gradually that it is an inconvenience learns to direct both Eyes to the same Object; if it is observed that he always employs one particular Eye to look at Objects, while the other is roving about for want of direction, the Squinting may be cured by tying up the good Eye till he has got a habit of directing the other properly. Blindness must arise from One of these Causes, first, that which prevents the passage of light to

the Retina

the Retina, or that which prevents the Perception of it; this last Cause is called the Gutta Serena. In this Case the Humours and Cornea continue as transparent as ever, but the Iris having no sensible Motion, the Pupil always appears equally large in a strong or weak Light

The Opacity which excludes Light may be in the Coats or Humours; if it is in the Cornea, we can readily discern it by the white and muddy appearance; when only that part of the Cornea is Opake, which is exactly opposite to the Pupil, we cannot so readily distinguish it by looking directly forward, as sideways. Ninety nine times in an hundred the Opacity is in the Crystalline Humor, being white it makes all the Pupil seem white

The Mouth & Nose

Lecture 7th

We shall examine the mouth & nose together. We already know the Cavities of the nose, & their communications, and we also know a great deal of the mouth. As appendages to the mouth are the Salivary Glands, these are commonly reckoned three pair, the principal of which is the Parotid. The Parotid Gland is situated immediately before & below the meatus Auditorius, it goes as low down as the Basis of the lower Jaw, & a good way inwards behind the lower Jaw; it is a conglomerated Gland: it has no one great Artery & Vein, but receives many little branches from the neighbouring parts, particularly from the Temporal Artery, which runs behind & partly thro' it. The Portio Dura of the seventh pair of Nerves passes thro' the body of this Gland in its way to be distributed to the face; the Branches of the Excretory Duct ramify in the Substance of the Gland like the branches of an artery, they unite into one common Trunk, just within the Substance of the Gland, which comes out at its Anterior part, it first runs a little upwards, then a little downwards, & crosses the outside of the Buccinator muscle just under the Projecting of the Cheek bone, then plunging inwards opens into the mouth nearly opposite to the third middle grinding tooth in the upper Jaw. Sometimes there is a little Lobe of this Gland that comes more forward on the Jaw, which sends branches into the other Duct: from its Situation the Gland must be pressed only the motion of the lower Jaw, & as it is observed, that increased motion on any Gland increases its secretion, we conclude that there is a larger quantity of Saliva poured into the mouth from this Gland in mastication, or Speaking. Sometimes it happens, that in a Wound of the Cheek, the Duct is cut thro' & the Saliva is discharged thro' the wound, sometimes the Saliva finds its proper Channel, & the external Wound heals up, but it happens likewise, that from the Duct being fairly divided, the two Ends shrink, & do not reunite, that part of it which goes to the mouth closes up, the Saliva consequently thro'

the external

the external Wound, & a Salivary Fistula remains. When the Case is recent, we should by applying sticking plaister &c on the external Wound indeavour to make the Saliva flow in it's proper Channel, & order the Patient when he speaks or eats, to put his finger on the external Orifice: if this should not succeed, we should make a new passage into the Mouth, & the best way to do this is to run a Skeign of Silk by means of an Eyed Probe sharp at the other End, from the Wound thro' the Muscle immediately underneath as near as possible to the Old Channel into the Mouth, leave it in for some time, till it is judged that there is a pretty clear passage made by it's becoming Callous, then withdraw the Silk, & heal up the external Wound. We have been Advised in this Case to destroy the Parotid Gland, but this is impossible; for to extirpate it entirely we must cut very deep down & in so doing we shall cut thro' the Trunks of the Temporal & internal Maxillary Arteries, which would Occasion a very dangerous hæmorrhage

There is hardly a possible chance of our destroying every the least bit of the Gland, and so long as any remains there will be a Secretion of Saliva, & the Fistula will in spite of all our Endeavours continue. Steno discovered the Duct in 1660, & published the Discovery the next year, therefore it is called Ductus Stenoses. In the Cavity between the Os Hyoides, & the Angle of the lower Jaw lies the Maxillary Gland, of the figure of the Cavity it is contained in it is sometimes called the Submaxillary. The Duct comes off above the middle anterior part, passes along the inside of the Sublingual Gland, & opens into the Mouth just by the Frænum Linguæ near the two Middle Incisor Teeth in the lower Jaw. All the secreted Juices of the body in some constitutions will form Calculous Concretions, and it is not uncommon for a Stone to be lodged in this Duct, it may be plainly felt & cut out: the Duct is liable to be stopped by Stricture too; from these Causes the Saliva may be accumulated & produce

a Tumor

The Mouth & Nose

a Tumor, which should be discharged by Puncture with a Lancet; often after:
:wards the Saliva will continue to flow thro' the new Orifice. — The
Sublingual Gland is a long thin Gland lying immediately under the
Membrane of the Mouth, one Edge towards the Jaw, the other towards the Tongue;
it reaches from the Symphises of the lower Jaw, where it nearly touches its
Fellow, so far back as the Maxillary Gland: it has no one common Excretory Duct,
but a number of small Ducts which open on the Membrane of the Mouth by
many Orifices placed in a Row. The Maxillary Duct has been known to all
ages: In all Writers down to Haller mention is made of the Maxillary &
Sublingual Ducts. — Haller thought that the Maxillary threw its Ducts into
the Sublingual. — A Process of the Sublingual Gland sometimes runs into the
Maxillary, but they always remain distinct. — There seems to be a difference
between the Maxillary & Sublingual Glands. The Substance of the Maxillary
is harder, & its Juice is not so ropy as the Sublingual, so that the Sublingual see:
:ms to be a mucous, & not a Salivary Gland. — The Maxillary & Parotid Glands
appear to be the real Salivary Glands. — Heister describes a soft white Gland,
near the Mala, & calls it the Malar Gland, he says it may easily be mistaken for
a piece of Fat; now there is a piece of Fat there remarkably tender, but no
Glandular Appearance. — The Parotid & Maxillary Glands do without doubt
sometimes inflame & suppurate. — But in Scrophulous Habits it often
happens that there are Swellings in the place of these Glands, & are call'd Parotid
& Maxillary Swellings, being supposed to be Swellings of these Glands. —
In these Cases it is generally found, that it is not an Affection of these Glands,
but of the neighbouring Lymphatic Glands, as appears from dissections.
The Labiales are small Glands situated on the inside of the lower Lip, they make
the inside unequal, & may be always distinctly felt in the living body, they are

Similar to

The Mouth & Nose

similar to the Sublingual, & secrete a Mucus. Besides the Parotid, Maxillary & Sublingual there does not appear to be any considerable Gland about the Face. The Small Glands on the inside of the Cheeks are called Buccales. The Oesophagus is fixed to the Basis of the Skull by a large Muscular Bag the Pharynx at its posterior part immediately before the Vertebrae, anteriorly it depends from the Basis of the Tongue, & runs down behind the Larynx & Trachea, it has a passage into it from the Mouth, & another from the Nose, between which the two passages the Palatum Molle & Uvula hang, so as to shut up occasionally at our pleasure either the One or the Other of them. The Cartilaginous valve, the Epiglottis when we breathe always stands up; when any thing is swallow'd, the Larynx is drawn up with a Jerk under the Tongue's Root, & at the same time the Epiglottis is pressed down by the Swallowing body, so that the opening into the Trachea is covered over, but if we speak at the same time that we swallow, we endeavour to keep the Larynx down, & the Aperture being open a Morsel gets into the Trachea & raises coughing to expell it, for there seems to be something more then pressing down the Epiglottis necessary to shut up the Aperture, we must first of all raise up the Larynx, so that it may prevent itself to the Epiglottis more fairly, & be covered by the Root of the Tongue.

The Mouth, Throat &c

Lecture 71st

At the Root of the Epiglottis are two little Cavities, in which we judge, that sometimes a little morsel of bread &c lodges, from the Uneasiness we feel thereabouts now & then after swallowing, & which we force away by a gentle hawking. When the Jaws are shut, the Cavity of the mouth is entirely filled up by the Tongue. The Tongue & parts underneath are drawn down to make a Cavity in the mouth, & to make a Vacuum there in Suction; any one attending to it will find that we do not suck by making Inspiration. Behind the Tongue takes an arched turn downwards, & makes the Anterior part of the passage into the Œsophagus. At the root or beginning of the Palatum molle is the Orifice of the Tuba Eustachiana which opens into the posterior nostril, or upper part of the Pharynx immediately opposite to the posterior edge of the Septum narium & leads on to the Ear. As Deafness was supposed to be sometimes owing to this Tube being stuffed up with mucus, it has been recommended in deafness to syringe the Tube by introducing a pipe bent at the End into it from the nose, but it seems hardly possible to know when we have got the Pipe into it in the living body. It has been supposed that the immediate Organ of Smell was just so much of the Cavity only of the nose, as lies directly under the Os Cribriforme, because it was said that the Olfactory nerves went no farther: but it is plain that they are spread all down the nose. There is no doubt of the Organ of Smell being diffused every where over the inner Surface of the nose. The Passage of the nose is very narrow, & easily clogged up by mucus in a Cold, or by the swell-ing of Snieder's membrane; the Cavity however is greatly extended by means of the Ossa Turbinata, & other bony Lamellæ. The Tongue naturally divides itself into two parts, the Root which is Glandular, & the other part which is Villous; at the Root of the Tongue is a pretty considerable blind

hole

hole — The Skin of the Tongue has very long Villi, & is covered over with a Cuticular Covering, as the Skin of the external parts is — The Skin is known to be the Organ of feeling or touch, but the Skin of the Tongue is the finest Organ of Touch in the body — Cesalpinus says, that in his Country (Italy) Jewellers will tell a Diamond from any other species of Gem, or Composition by their Tongue this however seems to be an exaggeration of the fineness of this Organ — The Tongue is also the Organ of Taste, & it is capable of Tasting on its upper surface only — It appears that no sapid body can be tasted till it is dissolved in a fluid, as in the Saliva for instance, that it may soak thro' the Porous Covering, & come immediately to the Nervous Surface, for we do not taste a piece of Sugar, till we have rubbed & broken it with the Tongue, so as to melt it in the Saliva, & if the exterior covering becomes thickened by any means, as Fur upon the Tongue for instance, we do not taste at all — It seems that the upper Surface of the Tongue is the Organ of taste alone, & not the roof of the mouth nor the Cheeks, for if we lay any thing upon any part of the mouth, except the Tongue, we do not taste it — We can feel with all of them, but to determine what is, & what is not concerned in the Sensation of Taste, we must distinguish between Taste & Irritation — The Palatum Molle on each side from the Uvula forms two edges downwards, one goes towards the cavity of the mouth, the other towards the Pharynx — These make two Arches on each side of the Uvula, an Anterior & a Posterior — in these Arches lie the Tonsils — The arches are formed by the Constrictor Isthmi Faucium & Palato Pharyngaeus Muscles. The Ducts of these Glands open on their surface by several Orifices — These Glands are often affected in Venereal Complaints, but from other causes, they often inflame, and swell with very irregular Surfaces, & the Cavities on their

Surface

Surface will be filled with Mucus, so as to appear like an Ulcer when viewed from the Mouth — We are often Apt in these Cases to mistake for an Ulcer what is only a Collection of Mucus — These are Mucous Glands, & when we swallow the Morsel presses against them, & squeezes out their Mucus, which forwards its deglutition — As the Tonsil is seldom the Seat of a Cancer, whenever it is necessary, there can be no Objection to its being extirpated, which is easily done by catching hold of it with a small hook & drawing it out, so that we can use the knife — Offensive Breath may be owing to rotten Teeth, or to Animal Substance sticking & putrifying about them; but the worst kind of Offensive Breath is caused by neither of these, tho' the Mouth & Teeth be ever so clean yet it continues, & is supposed to be a Mark of bad Health, which however is a false Supposition — Its Origin is owing to a disorder of the Tonsils, for the Cavities if examined are found to contain a pretty firm Mucus, which being picked out smells very Offensively — It may be remedied by rubbing & sponging the Tonsils every now & then with a piece of Sponge fixed at the end of a Stick to get at the Mucus; if this dont cure it, that part of the Gland where the Mucus accumulates may be cut out without any Detriment to the Patient — The Apthous Crust found on the inside of the Trachea is a concretion of Mucus — The Fur of the Tongue is commonly nothing but a concretion of Mucus, but sometimes it is a disease of the Cuticular Covering of the Villous Substance, which tho' scrubbed off ever so much will not appear clean as in a Healthy State — The Use of the Tongue is well known — Part of the Tongue may be cut off, & yet the Patient shall speak tolerably well — Mr Lambert at Newcastle cut a large portion of a Tongue off which was more than the Mouth could hold, & the Patient, a young woman speaks now with very little

very little awkwardness — Within the Larynx between the Thyroid & Aritenoid Cartilages on each side is a small blind bag, called the Sacculus Laryngaeus, made by a Ridge of two Cross Ribbands stretched from the Pomum Adami backwards, called the internal Ligaments — Dr Ferany supposed, that Speech was a Vibration of these Ligaments, that the One produced a grave, & the other a sharp sound. — It has been said that Drowned People are killed by the Apperture into the Larynx being shut, but upon immediate examination after Death it has always been found open — We can always with a sudden catch stop our Expiration: this might be said to be done by the Air from the Lungs, when we please, getting into the Sacculi Laryngii, & making a Valve by bringing the internal Ligaments of the right & left side together — But when we examine the passage, it never seems capable of being entirely shut up — Tho' they don't close it up, they may so stop the passage as to be the principal Agents in Coughing — A Bull & a Cow are without them, accordingly we find that they never cough with that smart Jerk that we do —

The Throat and Ear &c

Lecture 72

The Thyroid Gland lies in contact with the Larynx, Pharynx, Oesophagus, & Aspera Arteria: it is much larger in Women than in Men: its Substance is manifestly Cellular by making a puncture in it. We call it a Gland, but its Use is entirely unknown, there has been no Excretory Duct found. An Enlargement of this Gland makes the true Bronchocele, which is particularly frequent in Young Women; & takes its true horse-shoe shape. When it grows very large it feels soft but Dr Hunter can't say what it contains; when much enlarged it presses on the Carotids, & receives a strong pulsation from them, which often makes it mistaken for an Aneurism; how to distinguish it from One has been shewed already. It has been recommended to extirpate this Gland if enlarged, but this can't be done safely on account of its being so near the Carotid Arteries. Mr Gooch of Norwich has published a Case in which a Cyst formed in this Gland broke into the Trachea, & suffocated the Patient instantly. To a Lady who had this Gland greatly enlarged, & very soft Dr Hunter advised a puncture, a bloody Water was discharged, high Suppurative Fever came on &c and the Patient to be in great danger, but after a time she perfectly recovered. The Organ of hearing consists of a number of parts, the external Ear, the Meatus Auditorius, the Cavity of the Tympanum & the Labyrinth. The upper part of the Ear is call'd the Helix, opposite to this is the Antihelix, before the Antihelix is a little Eminence called the Tragus, which may be pressed over the Meatus Auditorius, the little Eminence opposite this is called Antitragus. The Substance of the external Ear is a gristle of that firmness, as always to preserve its proper form. In Quadrupeds it is larger than in the human body, & is moved by them, as we conceive, towards the place whence sound comes. There are several Muscles described by Anatomists, supposed to move the Helix, Antihelix, & other

parts of

The Ear

parts of this Gristle so as to adapt the external Ear to receive more or less sound; but they hardly deserve the name of Muscles, nor can we perceive any of the motions, that are talked of — From the Winding of the External Ear by one continued Cavity continuing in the Meatus — All Physiologists agree that it collects the Sound, & conveys it into the Meatus; if so we may suppose Hearing would be considerably injured by the Loss of the External Ear — the Gristle of the external Ear is continued inwards, & makes the outer part of the Meatus Auditorius: the inner part of it is all boney, at the upper & posterior part of the Meatus is Membranous, & in this part are many little dark coloured roundish bodies, supposed to be the Glandulæ Ceruminis, but we can press nothing out of them — the Width of this Canal is commonly the size of a Goose quill terminated inwards by the Membrana Tympani, & as the Membrana Tympani is placed obliquely against the Meatus, nearer to the horizontal than to the Vertical position, we cannot determine the Exact length of the Meatus; it is much shorter at top than at bottom — the Canal goes inwards & forwards with a gentle Winding — the Meatus leads into a Cavity called the Tympanum, divided tho' from the Meatus by the Membrana Tympani — It has been common to call the Membrane, the Tympanum, as if the parchment stretched across the head was the Only part of a Drum, but it is better to call the cavity the Drum, that is the Tympanum, & the Other, the Membrane of the Tympanum — the membrane seems to be a little more Vertical in an Adult, than in a young Subject — The outer side of the Membrana Tympani is hollow'd like a Funnel: the very point of the handle of the Malleus is inserted into the Center of the inside, & pulls it inwards, & looking upon the outside of the Malleus, appears thro' — As there is a Membrane, which covers the Pupil of the Eye in a Fœtus, so likewise the Ear has a Membrane spread over the outside of the

Membrana

The Ear

membrana Tympani; so fine as to appear like mucus: how this disappears by the time of Birth is not known. — Naturally the membrana Tympani is impervious, tho' some people have said it is perforated, and as a proof of its being so we are told of People discharging the fumes of Tobacco from the mouth out at the Ear by the Tuba Eustachiana, which opens into the Ear behind the membrana Tympani. When this is the Case, which is much more uncommon than it is generally imagined to be, the hole is certainly the Effect of some disease — a Discharge of matter from the inside of the Ear is very common: & the Ear ach is a very frequent complaint, therefore from inflammation and Suppuration we may easily account for this unnatural Appearance — The Cavity of the Tympanum is Oblong, of considerable extent from before to behind, very narrow & unequal, possessing the inside of the Pars Petrosa of the Temporal bone, it leads forwards into the nose by the Eustachian Tube (a bony ring on the Edge of the Temporal bone marks the place where the membrana Tympani is spread) — The inside of the maxillary Process of the Temporal bone is a Compages of little bony Cells, that communicate all with one Another, and with the Cavity of the Tympanum. — The Ossicula are all placed in the Cavity of the Tympanum immediately behind the membrane, commonly reckoned four in number, Malleus, Stapes, Incus, & Os Orbiculare, but this last bone is only a process of the Incus, so that in reality there are but three bones — The Malleus is bent at the middle between the head, and handle, where it has two processes, one a long sharp One, and a short blunt One, the head lies upwards and inwards, lodged in a concavity of the large End of the Incus, it resembles Hercules's Club much more than

an Hammer

The Ear

an Hammer - it is fixed to the inside of the edge of the Membrana Tympani by the blond process - To the small end of the Incus is fixed the Apex of the Stapes - The Stapes exactly resembles a Stirrup, only that one side bends out a little more than the other - These bones make a Chain quite across the cavity from the Membrana to the Labyrinth - The Basis of the Stapes stands upon the Fenestra Ovalis, the passage into the Labyrinth, hence it has been said that sound sticking upon the Membrana Tympani is communicated to the chain of bones, & that their Vibration gives the Sensation of hearing to the Auditory nerves - It is supposed that we adapt the cavity of the Ear to the quantity, & perhaps quality of sounds, as we do the Eye to Light - Some have described the motions of the Ossicula, but it is better to say only that they are moveable -

The Ear

Lecture 73[d]

Between the Manubrium Mallei, & the long process of the Incus runs a small filament of a Nerve, & because it runs across the Membranum Tympani in the same manner as the Chord does across the parchment of a Drum, it is called the Chorda Tympani — The Labyrinth lies in that Part of the Pars Petrosa that is im:mediately within the Cavity of the Tympanum: it's middle part is narrow & called Vestibulum, it's posterior End contains three semicircular Canals, the anterior End is called the Cochlea from it's resemblance to a Snail's Shell, imme:diately upon the Vestibulum lies the Fenestra Ovalis & Fenestra Rotunda — The Cochlea has a Septum, that winds thro' the middle of the Spires so that it contains two Spiral Cavities, which are called the superior & Inferior Scale, com:municating at the Apex of the Cochlea, but Dr Hunter never could perceive any thing like a Communication, for tho' he poured Quick-Silver into the One, it did not come out at the Other — All these Cavities are lin'd with a Membrane that is very Vascular — The Nature of Sound, & the manner in which it is conveyed, & modified not being nearly so well understood as the Nature of Vision, we consequently know less of the Use of the different parts of the Ear than we do of the Eye — Every body supposes that the External Ear, Meatus, & Cavity of the Tympanum, the Membrana Tympani, and part of the Labyrinth are only preparatory to the more internal parts, to collect Sound, & convey it to the immediate Organ of Hearing — The External Ear, and Meatus undoubtedly serve as a Funnel to convey the Sound — As a great Number of Rays of Light brought to a point on the Retina produce a strong sense of Light, so a great Number of Ray of Sound will produce a proportional Effect on the Auditory Nerves — The Firing of a Cannon often makes

those

The Ear

those Persons deaf whose business it is to be close to them at that time, and it is said that after proving the Cannon, or any Violent firing, their Ears have been known to bleed; very commonly there is a small artery running along the Tympanum, which perhaps is ruptured along with the Tympanum in this Case. Some have supposed the Septum of the Scale of the Cochlea to be the immediate Organ of hearing. at its beginning it is broad, and grows narrower, and narrower as it advances to the Apex, therefore they say that the nervous Chords are stretched across it, which decrease in length, as the Septum decreases in breadth; that the Chords are made to Vibrate as will produce a greater or less sensation of Sound in proportion as a longer, or a shorter One is made to vibrate, in the Same manner as the String of a Violin is made to Vibrate, which is in Union with the Sound produced by the Vibration of a String of another Violin. Mr John Hunter thinks that the three Semicircular Canals are the immediate Organs of hearing, for he finds that in Comparative Anatomy, these parts are almost always present, whereas several of the Others are frequently Wanting. The Diseases of the Ear are but little understood. As opacity in the Eye, & insensibility of the Optic nerve are the Causes of blindness, so in the Ear there is a deafness similar to the Gutta Serena, that is, from affection of the nerves, for hearing will vary according to the nerves of the Body in general being weak, or stronger. There is deafness too similar to Opacity in the Eye, something clogging up the passage, & preventing sound from passing properly modified to the immediate Organ of hearing. When the deafness is not nervous, we can do nothing for it, if the cause is more internal than the Meatus Auditorius. If the Meatus is stopped up by Wax, that may be washed away by

Syringing

The Ear

Syringing the Ear, the Cotton or Wool put into the Ears occasions and increases this complaint, for little loose pieces are left in, and have the Wax greatly accumulated on them — A Musician was cured of deafness by syringing his Ears, & immediately after the plugs of Wax came out, and for some length of time after his Hearing was so acute, that the common sound of any One conversing was too powerful, and gave him pain, but this wore off gra:dually. — There frequently are Abscesses in the Ear, and we see the Ossic:ula Auditus come out sometimes along with the Matter, notwithstanding which the Patient seems to hear tolerably well — A Person might feel a Vibration of the Air by any part of the Surface of his body without having any thing like an Ear to collect Sound, so also a Man with a Gutta Serena is sensible of the Light of the Sun when his Eye is turned towards it not from a perception of Light, but from the Warmth he feels upon his Eye —

Chirurgical Operations

Introduction, Lecture, 74th Oct

There is no saying where Surgery had it's beginning: there have been found no People without it, therefore it may be considered as coequal with mankind. Nature & Ease must have taught a Cure for many disorders and Chirurgical means must have arisen from the Observations, & Experience of what happened from the Endeavours of any One wishing to afford relief & assistance. It is an undetermined question, whether Physick, or whether Surgery ar: :ose first, probably the first man that had an Accident was the first Surgeon, to himself too: Others afterwards meeting with Accidents would apply to him as the most likely Person to help them who had helped himself, not choosing to rely on their own judgment now there is somebody to apply to, as he did when he had nobody to apply to that knew more of the matter than himself. The Cutting out of Arrows, & pulling off dead parts from the body was undoubtedly one part of Surgery early in Practice. Any One who took care of a wounded Person would naturally consider every thing relative to the Case, therefore he would direct pro: :per food, & if it had been Observed that Opening the body had been useful, some purging herb for medicine. So that Physic & Surgery were generally both united in One man in all Countries. It was so among the Greeks who are the Oldest Practitioners we know of. We commonly now divide the Profess: :ion into three parts, the Physician, the Surgeon, & the Apothecary. Celsus gives us the method of curing diseases under three heads, by Diet, by medicine, & by manual Operation, & thinks that the last is the most ancient of the three: He mentions the names of several Authors, who profe: :ssed & wrote on the last branch alone, particularly Greeks of Alexa: :ndria whose works are lost to Us, & at his time this branch was divided from the rest. From the nature of the thing indeed it must have necess: :arily been divided, for all men are not of that firmness of mind, and

Dexterity

Introduction

Dexterity of Hand so requisite in the Office of a Surgeon, to work properly upon the most piteous Objects without being affected too much at their distress. And a Man who by some lucky Accident had gained the reputation of a good Surgeon, would be so frequently applied to in similar matters, that he would find employment enough in Surgery Alone, & would reject every thing else. This might be done in a populous place, where the number of Inhabitants was sufficient to afford him business in one branch Alone, by which he might get a reputable Maintenance. It was a question particularly at the time of Dr Mead, & others of his Cotemporaries, who were great admirers of Greek Learning, whether the moderns had improved Surgery in any thing? It was then given in the negative, & on the side of the Ancients, but now no One withholds the Palm from the moderns so justly due to them.

It is commonly said that Surgery consists of five parts, therefore called the Pentateuch of Surgery, thus, Wounds, Tumors, Ulcers, Fractures and Dislocations. These with the Operative part take in the whole. It is however more proper to say it consists of four parts, viz Union, Division, Substraction, & Addition. The Order that is commonly followed in treating of Chirurgical Operations is to begin at the Head, then go down to the Trunk, and take the Extremities the last, but we shall deviate from this Rule. Before we determine upon an Operation especially if it be one of consequence, we should consider the following maxims —

1. Be sure of the nature of the Disease —
2. Will the Disease be removed or more tolerable by the Operation? —
3. Will the Habit admit of the risk of Life incurred by the Operation?
4. Is there any Accident likely to happen, which might be imputed to the Operation, and thereby hurt its reputation? —

5. we must

5. We must accommodate ourselves to the habit of body, & mind.

6. Is it better to do the Operation now, or at another time?

7. Will it be better to do the Operation, or let it alone, from considering the Chance of doing well if it is, and if it is not performed? Better to leave a doubtful Case to Nature

8. Endeavour to persuade a Patient into an approbation of the Operation

9. Let every Operation be done in as simple a manner as possible

10. Take care to have very good Instruments, and enough of them in case of an accident

11. Adapt the method of doing the Operation to the particular Case, and go thro' the Operation first of all in the Imagination

12. Keep all formidable Preparations for the Operation from the Patient

Com— Lectd 7th

Sutures

Lecture 75th

A Divided part will shrink and the two wounded edges will recede, & there will be a Cavity – This Cavity will be filled by a Process of nature, by Granulation, & when filled up the whole will be cicatrized over in two Ways, the Old Skin is drawn out round it from the edge of the Wound, & a new Skin covers the Center; the new Skin is very small in proportion to the Wound, its Surface is not grained like as the Skin is, and is of a different texture, – We observe that a round Wound will not heal so well as an Oblong One, because the Skin when drawn to a narrow Center dont lie at Ease, it will heal more readily if the edge of the Skin is notched & made uneven, – Old Sores will not heal, or if they do heal they will break out again, for the long continued inflammation has so united all the fibres of the Cellular membrane that they are no longer loose, so that the Skin is bound down all round, & cannot be drawn over the Sore to cicatrize it – this seems to be the reason why a good quantity of Skin being left, when a large Wound is made in some Operations is of Service – Old Sores are troublesome too from their having become habitual. –

Without waiting for this tedious Process Surgeons have devised the retention of the Lips of the Wound together so that they may unite by inosculation – this is done by Bandage or by Suture – But before we attempt this, we must consider whether the wound is proper, whether it contains any extraneous body, and whether it is contused so that Suppuration may ensue – We have been advised not to sew up a Poisoned Wound – In this Country however

however we have hardly any such thing as a Poisoned Wound — when a Wound is poisoned, the Lymphatics generally inflame and mark the Skin with Lines that shew their very course — A Boy cut his knuckle with a knife, the Wound festered, the whole hand & Arm inflamed, red lines ran from the finger up to his Arm Pit, and he was attacked with St Vitus's Dance, and a Mixture of Hemiplegia — From the circumstance of the red Lines, Dr Hunter concludes that the knife had been poisoned by some means or other — The Bite of a Mad Dog is a poisoned Wound — Dr Mead's Lixivium does nothing in this Case — The only medicine that seems to be of any ser:vice is Hill's — It is not certain that the Seabathing does any good — The best way is to cut out the bitten part immediately, even take off a finger or two, and if it is a part that will not admit safely of being cut out, we should cauterize as deep as we can with Safety —

Transverse Wounds at the joints & bending parts require only a particular position of the parts, and keeping right by Bandage to bring the Lips together so as to unite — In Superficial Oblique wounds the dry Suture with proper bandage is all that is necess:ary — Superficial Longitudinal Wounds require only the uniting bandage — In deeper Wounds either transverse or Oblique Stitching is necessary — The Stitches should be taken about the same distance from the Lips as the Wound is deep, the Wound should be stitched up bleeding, and the Edges only just brought simply into contact — Sutures hardly ever are usefull; they who approve of them say, that they make the Scar less, but this is wrong; for as soon as

Sutures

soon as the Wound has suppurated, the Skin will be drawn together naturally, and only a Line of Cicatrix left when all is healed, supposing that we have left the Wound alone to itself —

Wounds of the Tendons were supposed to be very dangerous especially if partially divided: Tendons cut or torn thro' don't require to be stitched; when the Tendo Achillis was cut thro' or ruptured, it was a common thing to bring the divided ends together by a Suture, so in other Tendons, but they only require to be brought as much into Contact as possible putting the Limb into a favourable position, so that Surgeons no longer use the Suture here. It was found, when great Symptoms of Inflammation came on, that it was necessary to take out the Stitch, nevertheless the divided Tendon united. —

Dropsy

Lecture 76th

Dropsy is of two kinds either local or universal, both are the Objects of Chirurgical Means. In Anasarca the Scarifications should be small, either upon the Small of the Leg or on the Instep; a few punctures will discharge a great deal of Water. It has been said that small wounds will heal up soon, and if so, new ones may be made without giving much pain to a cold Dropsical Leg. Small Incisions are not so apt to inflame as large ones, & when the incisions are inflamed, the Water ceases to flow, when large incisions likewise are made, the Limb is apt to mortify, but when small ones are made, hardly ever. Blisters have been used to take off Anasarcous Swellings, but from these the Water don't continue to run in such quantity, as from punctures; tho' the Skin stretched by the Water is very porous, yet it soon inflames, & is hardned so that the Water does not pass thro' it. The Ascites may readily be distinguished by the Undulation. The carrying off the Water of an Anasarca will not take off the Ascites. almost all we do for the cure of Dropsy by Medicine is to little purpose, unless in young & very good habits. Strong Purges are particularly hurtfull. Sometimes Dropsies cure themselves without our being able to assign any apparent cause; Purgings Sweatings and increased Secretions of Urine break out naturally, the Swellings subside and the Patient gets perfectly well. We have nothing that will make the Absorbing Vessells do their Office more briskly. our Purges, Diuretics &c only increase the Weakness and consequently the Dropsical Complaints.

Dr. Hunter related a Case of a Gentlewoman who was labouring under a Dropsy, & who was cured of it in a very singular manner. In Scotland where this Lady lived, it was a Custom to have the Sacrament administred

administered once a Year in every Parish, & she being a very religious Woman was desirous of receiving it in the adjoining Parishes as well as in her own, for which purpose ill as she was, she sat off on horseback behind her Servant — As they were riding along on the top of a Smooth but rather hastily declining descent, a Covey of Partridges flew up & frightned the horse, upon which he startled & she was immediately thrown & kept rolling over & over from the top of this precipice to the bottom, & when the Servant came to her she was quite senseless, — as soon however as he was able to get her assistance, they lifted her up & she gradually came to her senses, but there was such an Ama:zing quantity of Water flowed from her with her Urine, that before she reached home, she was almost as small again as when she sat out, & in short the discharge continued till she was perfectly cured —

Dr Ross had been long labouring under an Ascites, & was at last so much reduced & his general health so much impaired that his Stomach rejected every thing that was thrown into it, except a Teacupfull of Chocolate which he used to take 3 times a day; one day he found him:self very sick after taking his Chocolate as usual, & was greatly frigh:tned thinking now that nothing would stay on his Stomach & that consequently he must die — His sickness increased till he Vomited & was surprized to see that he brought up a large quantity of water besides the Chocolate he had just drank. he could not imagine how this could be, for he had taken nothing for several days, but his Chocolate; In a few hours after he felt an uncommon rolling &c in his bowels, & then had two or three purging Stools successively which brought away a great quan:tity of water; he now sent for Dr Hunter, who advised him, as this appeard to be an Effort of Nature to cure his complaint, to assist her by some gentle Purgative — He accordingly took some Tincture of Rhubarb by the assistance of which

of which he got perfectly recovered, & lived two years afterwards tho' he was an old Man, & had been long very infirm previous to this disease —
We must be particularly carefull that we do not precipitately determine on Tapping in Women, for they may be with Child & deceive us, The method of puncturing the Belly among the old Surgeons was with a narrow pointed knife, for they knew nothing of the Trocar, and they let out the Water gradually and not all at once, therefore to avoid the terrible faintings & even Death, which they found often to ensue upon its being let out all at once, Dr Mead first thought the Cause why People fainted and even died, after the Water was drawn off suddenly, was on account of the pressure of the Water, on the Heart, Lungs &c being removed all at once, he said that the pressure being removed, the Blood easily accumulates there, and that it was derived suddenly from the Head so as to produce those Effects during the Operation, therefore a bandage was used to make an artificial pressure, by being drawn tigther as the Water was discharged, At present however no other pressure is made than that of the hands, The best method of Tapping is without using any pressure, but placing the Patient on a Couch or Bed, so that no faintings will arise; and we shall get out more water if we make the left side the most depending, We prefer the left side to the right to avoid the Liver more certainly, as that Viscus is often found greatly enlarg:ed in Dropsical Cases, and so indeed sometimes is the Spleen, We thrust the Trocar into the Abdomen midway between the Navel and the anterior point of the Spine of the Os Ilium, We chuse this

part —

part to avoid the Epigastric Artery, which runs up from Poupart's Ligament, along the inside of the Rectus Abdominis – We pierce on the outside of that Muscle – Some have recommended a small wound to be made in the Skin first with a Lancet, because they say the edge of the Trocar don't cut: but this is unnecessary, for with a small stab the Trocar easily pierces thro' all – When all is over we should gently turn the Canula about to get out with as little pain as possible – The Wound, tho' penetrating, never does amiss, The Patient's body should be rolled for a length of time afterwards, or laced in a waistcoat, which is better than a Roller – Mr John Hunter prefers not rolling the Patient's body for two or three days after the operation; as he thinks they are less liable to those pains consequent on the operation, if not rolled directly – The round Trocar does better than the flat One, because it makes a less wound, & if done quickly gives hardly any pain – Sometimes the water of a Dropsy is Gelatinous, but is never so when lodged in the Cavity of the Abdomen – It hardly ever happens but when a Woman is tapped, which makes it seem as if it was contained in the Ovarium – Dr Hunter has only seen this case once happen in a Man, which proved to be an Encysted Dropsy of the Liver – Cysts contain Hydatids which are full either of Water, or of Jelly, and the Jelly is sometimes thick & sometimes thin – The Dropsy of the Ovarium makes a hard Tumor at the bottom of the Belly, and before it is grown very big it is moveable, and may be moved from side to side by the hand, the health is good, the Menses as usual; in short except from the Swelling the Woman ails nothing at all – Sometimes the fluid is contained in more than

Dropsy

more than one Bag, and by rubbing the hand over the swelling we can feel the inequalities of the Cysts. In time it fills up the abdomen, distends it, and might be easily mistaken for Ascites; when it becomes big, it becomes troublesome by pressing on the Viscera, particularly the Rectum, and the Bladder, which last is pressed against the os Pubis. The Fæces and Urine are not properly evacuated. Patients in this Case may be eased for the present by kneeling and lowering the Shoulders forwards, by this means the weight of the Tumour will be thrown off from the Pelvis towards the Chest, and having suffered greatly from the Pressure, they will be eased immediately. By the pressure Ill:health is brought on, which in time will kill the Woman if the Disease remains. We can do nothing material by way of Cure, for we cannot cure them, We can only ease the Woman from time to time by puncturing with a Trocar; the water will nevertheless accumulate. We must direct her how to take advantage of that position, which will ease her for the present, & attend to the general health. If there happens to be but one Cyst, the Operation goes on as in the Ascites, but we should use a large Trocar lest the fluid should be Gelatinous: if there are more than one Cyst, we can only take one at a time; after we have once opened the Ovarium, the water will again accumulate from it, but will be shed thro' the Opening into the Abdomen. Mr Le Dran has proposed a radical cure of this complaint by making incision into the Ovarium, but it don't seem

to be

Dropsy

to be probable for generally there are more than one Bag, which will require so many different Incisions — Some have recommended Excision, but we cannot see where we ought to cut, were we not to insist upon the danger that must attend such a penetrating Wound of the Abdomen — The Tumor as it extends forms Adhesions to all the neighbouring parts, it dont adhere by a Peduncle only, so as that we might draw it forward, and cut it off —

Dropsy in the duplicature of the Peritoneum has been very much talked of, but it appears to be nothing more than Dropsy of the Cellular membrane near it, either diffused thro' the Cells or contained in a Cyst — Long continued Friction with the hand smeared with Oil is of great Service to Dropsical Limbs —

Hernia

Lecture 77th

By a Rupture is understood a protrusion of some of the Viscera of the Abdomen so as to form an external Tumor – when this happens in the Rings of the Abdominal Muscles, it is called the Bubonocele, if under Poupart's Ligament Crural or Femoral, if at the Navel, umbilical; if at any other part of the Belly Ventral – The Name Rupture implies that the part is burst, hence a broken belly signif:ies the same, but in the common rupture that appears gradually the Peritoneum is never ruptured, but it is only protruded out of the Abdomen, stretched & Elongated – Perhaps when a rupture comes on suddenly from some great Violence, & it is at that time very large, the Peritoneum is ruptured – As the Tumour increases of course the Skin of the Scrotum rises, till it almost or entirely hides the Penis. The protruded parts always lie within a Sac, & the Spermatic Artery & Vein with the Vas Deferens lie behind the Opening into the Sac: after having returned the parts into the Abdomen there is such a thickness underneath the finger as gives the feel as if more was still remaining unreturned – The Sac is never to be returned, for it is fixed by the Cellular Membrane of the Scrotum – As an Hernia increases it pushes downwards, dissects itself a way thro' the Center of the Spermatic Chord, so as to separate the Artery, Vein & Vas Deferens – When the parts protru:ded do not Adhere to the Sac, commonly they are easily returned into the Abdomen, when the Patient lies on his back, but when they adhere to the Sac they never go up – The Intestines are seldom found to Adhere, which is perhaps owing to their Peristaltic Motion – those parts which have no Peristaltic Motion are what are commonly found to Adhere as the Omentum & Appendix Caeci – The Scrotum remains open into the

Abdomen

Hernia

Abdomen in a young Child, & thro' this Opening the Intestine or Omentum easily pushes out in Coughing or Crying & come into Contact with the Testicle — this is what Haller calls the Hernia Congenita — All Other Hernia have a Sac distinct from the Cavity of the Tunica Vaginalis Testis — Lax Habits are said to be liable to Ruptures, — Fat People are more commonly Subject to Hernia than lean, for by the increasing bulk of Abdominal Contents, when the Fat is accumulating, if there is a any weak part, they will push the Peritoneum out there — Women that have born Children, have very often Herniæ, especially Umbilical Herniæ, the Abdominal Contents are protruded by the efforts used in birth — The Hernial Sac is smallest at its upper part, & the Tumor is of a Pyramidal figure, because at its upper part it is pressed by the Tendinous Ring, & if the Patient has worn a Truss the upper part is still narrower; for then it is prevented still more from dilating by the Pad pressing on that place, and perhaps part of it is thus made to grow together — It is sometimes very difficult to distinguish a Rupture from other Disorders especially from an Hydrocele — Any Medicine given internally will have but little Effect, and none farther than strengthening the body — A Truss is the only thing that can be of any Service, and should be made of truly Elastic Steel — When a Truss is worn for a Cure, the Rupture should never be suffered to come down, & therefore should be worn night & Day, for once coming down undoes all that has been done in a month before — Young men & Children get well very commonly by a Truss — The Opening into the Sac

from

Hernia

from the Abdomen is made by the constant pressure of its two sides together to close up, & is Obliterated. Its Use should therefore be persevered in for a length of time, even two or three Years. The Hernia Congenita that happens to young Children just after Birth does well, & that very soon provided the protruded parts are reduced & kept up. Sometimes it happens that the Truss occasions painfull Varicocele in which case it must be left off & the Hernia suffered to remain as it is. Twenty different Operations have been advised for the cure of those Ruptures, which are easily reduced, Some have advised cutting off part of the Sac, others to destroy part of the Sac with a Caustic, but Dr Hunter disswades from all these Methods, for he says, while the Tendon remains dilated, the Cicatrix will not be strong enough to resist the pressure of the Abdominal Viscera, & we cannot think of curing an Hernia at the expence of a Testicle. In a Woman perhaps on this Account, the Caustic might be more preferable, but the Rupture is at least made so tolerable by a Truss, that these Methods are hardly ever worth the while to be tried. How Inflammation & Strangulation come on, is not understood, but the Case is then very dangerous, & we must immediately endeavour to reduce the Hernia, for the longer it continues unreduced, the greater will be the danger of Reduction, owing as we apprehend, to the Blood being detained & increasing the Bulk. When we attempt to make Reduction, we must gently press the upper part of the Sac narrow with the fingers of one hand, & press the Hernial Contents upwards with the fingers of the Other hand, humouring & varying the pressure from side to side, the knees being bent forwards & the body backwards to relax the parts at the same

Hernia

the same time. The pressure should be continued for some considerable time, for we may dilate the opening into the Abdomen by degrees, till at last we get the Contents all up, after having given the Patient a good deal of pain & tired ourselves, it often happens that just as we are determining to leave off, they go up all at once, then the Iliac Passion & other Symptoms cease. We should ever for the last Attempt use some considerable pressure, & with a Jerk to give all possible chance for Reduction before we desist. When the Rupture has been constantly down for a number of Years, we may conclude there is Adhesion to the Sac & our Attempts will be to no purpose. In all cases, our Endeavours for Reduction must be made at once, & if we do not succeed, then determine upon the Operation, without waiting to see what Bleeding, Glysters, Fomentation or Poultices will do, which appear to do nothing at all. The Intent of the Operation is to set the strangulated part free. All Surgeons allow when the Iliac Symptoms are come on, that the Patient must die, if the Operation is not performed, yet they are greatly divided about the importance of the consequences of the Operation; Some say it is attended with but little danger, Others that it is exceeding dangerous. It certainly is dangerous, as are all penetrating Wounds of the Abdomen, but the danger will increase in proportion as the Operation is longer delayed. We cannot say how long it may be deferred safely, therefore it is best to perform it immediately after our first proper Attempt has proved ineffectual. It has been supposed that a small Rupture when strangulated is more dangerous than a large One under the like circumstances, because the large One cannot be so completely strangulated as to entirely interrupt the Circulation, & so bring on a Mortification so soon as in a Small One: but this Observation is of little use in practice, as in two Persons with similar diseases, the One shall die in two or three

hours

hours, the Other lives as many days – The purpose of the Operation is to ~~cut~~ cut the Tendon that girts too strongly on the protruded contents, This we can do by making an incision immediately down from the Skin upon it without wounding the Contents, for they having room without the Tendon rise up, so that it makes a Groove in them below their Level, we therefore open the Sac at its lower part first, & then cut upwards to the Tendon by sliding along a cutting Instrument directed by the finger, we begin by making an Incision from the part Opposite to the Ring, down to the lower part of the Scrotum thro' the Cellular Membrane; this must be done by carefully dissecting till we come to a smooth Surface, which is the Cremaster muscle; we cut thro' this Muscle with Care, & then we come to the outside of the Hernial Sac; Mr Arnaud has recommended a hook to catch hold of & draw up the Sac from the Contents, that we may make an Opening into it with safety, but if a Person cuts carefully he may do it without any other Instrument than the Knife; After having made a small Opening we must lay the lower part of the Sac open with a pair of Scissars, & then open the upper part with the same to the Ring – All now is laid open but the strangulated Tendon & sufficient room is given for examining the state of the Hernia – then we are to introduce Mr Arnaud's crooked button pointed Bistory, under the Tendon into the Abdomen, & cut the Tendon upward & outward – Every thing is now set at Liberty & made ready for being returned up into the abdomen, a small incision of the Tendon will be sufficient to release the Stricture – If all is in a good state, the protruded parts may be returned into the Abdomen without any more to do, but if the Intestine is mortified, we are advised to cut off the mortified part, & sew the divided ends of the Intestine by the Mesentery to the external wound just without the Tendon after we have returned the other parts, so that it may remain an Anus – Sometimes the divided Ends have been found to unite, & the Faeces have taken their Old Course after the External Wound healed up – If there is any part of the

Epipploon

Epiploon, Mortified, it must be cut away before we return it, leaving only a little to slough off, & in doing this there will be no Occasion for a Ligature; If there are small adhesions, we must cut thro' them: If the adhesions are considerable, we must be content to have saved the Patient's Life for the present & leave the parts in the same situation they were in before the Violent Symptoms came on, now that the Stricture is taken off, there will be no occasion to sew up the Wound in the Scrotum, we need only put a Couple of Stitches at the upper part by the ring to prevent the Cavity of the Abdomen from being exposed as much as possible, which Mr John Hunter thinks is the chief cause of all the mischief after this operation — If the Surgeon should by chance have wounded the Intestine in Opening the Sac, we are advised to keep the wounded part at the bottom of the Wound in the Tendon by a Ligature hanging out, so that the wounded Edges of the Intestine may grow & unite with the granulating Wound in the Tendon, & thus be consolidated with & closed up by the parts — In treating Penetrating wounds of the Abdomen, we should sew up the Wound without including the Peritoneum in the Ligature, after we have returned any of the Abdominal Contents that might have protruded — If the aperture is too narrow for their Reduction we must dilate it by a small incision — If the protruded parts are wounded or Mortified, we must treat them in the same manner as we would in Hernia — The Operation in Hernia & that of Gastroraphy are then very similar

Hernia

Lecture 78th

The Present Professor Monro advises us in case of a strangulated Hernia to make an Incision down upon the Tendon that makes the ring, then insinuate a Director under the Tendinous part a little above the ring, conveying it downwards between the Tendon & muscle underneath; bring the End out at the ring & cut clear thro' upon the Director, by this means, he says, the strangulating Tendon may be cut without open:ing the Sac, or penetrating the Cavity of the Abdomen. The Surgeons of Bristol have often performed the operation in this manner. The great Objections to it are the following, 1st we are left entirely ignorant of the State of the Intestine at the time of the Operation. 2dly the Groove or furrow caused by the ring compressing the mouth of the Sac, makes it very difficult to cut on that part without wound:ing the Intestine, & lastly the Strangulation is sometimes caused by the mouth of the Sac independant of the Tendon, & then cutting the Tendon is of no Service. The Epiplocele is difficult to reduce because of the Bulk of Fat in the Epiploon, & generally Hernias happen to fat People; the Difficulty is such that we cannot at any time return it into the Abdomen. Some have advised Reduction to be made by making the Patient lean, & if there is no adhesion this will do, for as the fat of the body is diminished, the bulk of the Epiploon is diminished so as to admit of being put up. Some have recommended the operation in this Case very strongly as being only to cut off a bit of Fat, yet many have died in consequence of it's being done. It cannot be too strongly inculcated, that all penetra:ting wounds of the Abdomen are dangerous. If an Epiplocele can't be returned

returned on Account of Adhesion, yet a Truss should be worn to
prevent any Intestine getting down - there is a chance of the Truss by
pressing the opening of the Sac & Epiplocon continually together, bring:
:ing on such an Union as shall entirely prevent the descent of any
thing Else - Femoral Hernia seldom grow big, for Pouparts Ligam:
:ent will not suffer any considerable quantity of Intestine or Oment:
:um to get under - they have always a Sac & are generally from a
Nutmeg to a Goose's Egg in size - they must be reduced & kept up by
a Truss, which however is a difficult thing, for the Motion of the Thigh
is continually throwing the Pad upwards - When a Femoral Hernia
comes to a Strangulation, we should press to the utmost to return
it - If we cannot return it recourse must be had to the Operat:
:ion, we must open the Sac very cautiously, for it generally adh:
:eres to the turn of the Intestine that is strangulated by a kind
of Mucus; - this rupture is often unattended to, for it is generally
but small, it is commonly very hard like a Ball, & so much
resembles an Indurated Gland, as easily to be mistaken for a
Bubo if we do not examine it thoroughly - One small turn
of Intestine usually constitutes this Hernia - To operate for
the strangulated Femoral Hernia, we make a longitudinal incis:
:ion exactly midway between the projecting part of the Os Pubis, &
anterior Superior Spine of the Os Ilium thro' the Skin, & Cellular
membrane very carefully till we come to the Tendon that makes
the Ligament & to the Sac; we must open the Sac downwards
to the bottom, & upward to the Ligament with the Crooked Scissars
then gently insinuate the Crooked Button pointed Bistory under the
Ligament into the Abdomen & cut it - If we cut the Tendon upward &
inward

inward we shall cut the Spermatic Artery, & if we cut upward & outward, we shall probably cut the Epigastric Artery. As the two Arteries cross each other some have advised us to use a knife that is blunt for cutting the Tendon, thinking thereby to avoid the two Arteries. Mr Arnaud directs us to use a blunt hook to make way for the reduction of the parts, by drawing the edge of the Tendon upwards from them, but tho' this seems plausible, we should rather cut the Tendon, as if we cut directly upwards we shall pretty certainly avoid both Arteries. Women are more liable to Exomphalos than to any other Hernia; Men have it but seldom; This in a Child may be cured by pressure; a Compress must be placed upon the opening after the parts are reduced, & be confined in its place by a sticking plaister spread on strong Linnen: In very fat People the navel lays as in a Well, in such a Case it is best to make Bolsters of the Empl: Roborans. cutting pieces round from the size of a Crown piece to a little point, placing them on each other in form of a Pyramid. A little Cotton is to be laid on the navel & upon that the Apex of the Pyramid & over all a broad piece of plaister with a margin, which is to be secured with a Dimity Bandage: If it is strangulated, & Reduction cannot be Effected, the operation of freeing the Stricture must be determined on without delay. We may make the incision on either side of the Tumor, first opening the Sac & then with a knife used in the Bubonocele enlarge the opening; this is commonly ordered to be done towards the left side by which we avoid the Umbilical Ligament, but cutting that is of no consequence, as it never remains pervious so low down. This is often a very puzzling Operation, because the Contents of the Sac sometimes lay immediately over the ~~Continuing~~ opening into the Abdomen.

Ventral

Ventral Ruptures seldom require the operation, for the opening is not so narrow generally as to strangulate the protruded parts – Ruptures are said sometimes to happen thro' the Foramen Magnum Ischiij but these can never be the Object of a Chirurgical Enquiry – nothing can be done for them. ——————

Hydrocele

Hydrocele is said to be of two kinds that in which the Water is in the Cellular Membrane, & that in which the Water is in the Tunica Vaginalis Propria Testis, but the latter is the only true Hydrocele. When Water is collected in the Cellular Membrane, the Scrotum is equally distended on both sides most so at the bottom & feels Oedematous, – a little puncture or two at the bottom will evacuate all the water; Water in the Tunica Vaginalis propria Testis forms the true Hydrocele – The Swelling at first appears like an enlarged Testicle, afterwards the Water may be felt on the forepart & sides, behind we feel a fleshy substance which is the Testicle – There is a very parti:cular feel in a bag of water, very different from that of fleshy Substances, & therefore we may generally readily distinguish an Hydrocele from an Hernia: another particularity however which is always Observable will never fail to set us right, and that is, that in the Hydrocele the Swelling is confined to the Scrotum & in the Hernia the Swelling is continued from the Abdominal Ring all the way down to the Testicle, & the Patient will generally have observed it to have been moved & disappear on lying in bed &c. & coming down again on Coughing, straining & the like – The Tumour is largest at the bottom whereas in an Hernia the Swelling is greatest at the upper part; the Spermatic Cord may be commonly felt small & distinct, but sometimes the Water directs its way

upwards

Hydrocele

upwards & presses the upper part of the Tunica Vaginalis, so high as to make the Tumor appear as if it come out from the Abdomen at the Ring. In such a Case it may easily be mistaken for a Hernia. Oftentimes Water is collected in the Tunica Vaginalis & the Testicle is at the same time diseased & enlarged. Sometimes the Tunica Vag:inalis adheres to the Testicle, so as to make two or more Cavities, & if a Trocar is thrust into an Hydrocele in this state, it will evacuate one Cavity & not the rest. This is called the Encysted Hydrocele. Young Children a Month or two old often have an Hydrocele so that the Parents mistake it for an Enlarged Testicle: it always goes away of itself without doing any thing for it, if we puncture it it comes again, & at last goes off naturally. Dr Hunter has lately seen one Case, where this Hydrocele has remained five or six Years. In grown People it very seldom, indeed hardly ever goes away of itself. In an Old man, a bad Habit or where the Testicle is diseased the Radical Cure is not to be attempted. All Surgeons are agreed that Physic, Issues &c will not empty the Tunica Vaginalis so that the Water must be drawn off from time to time either by puncturing with a Lancet, or by using the Trocar. The Tumor should be pressed on the sides for by so doing the Water is brought forwards and the Testicle thrown backwards, then we should plunge in a Lancet at the Anterior part; If a Lancet is used, a Probe should be introduced directly afterwards: The wound only requires a bit of Lint a sticking Plaister, but the disease generally recurrs again. The Dr related the Case of a Scissar Grinder who had a Hydrocele & for whom he had let out the Water three times with a Lancet; He saw him some Years aft:erwards, & he then told him that he had had several returns of his complaint, but that being unwilling to trouble him any more he had always let the Water out himself with a sharp pointed knife: What

became

became of him after this time the Drawer heard or knew. Hydrocele will often cure itself. From stretching the Bag at some time or other inflammation comes on with Fever & Suppuration, at last the Bag bursts, & when healed it adheres so as to leave behind it no Cavity. The same Process would take place in an Ascites, but there the inflammation infallibly kills the patient. It is worth a Young Man's While to go thro' the Operation for the Radical cure. The Radical Cure is brought on by Inflammation being produced to such a degree as to unite the Testicle & Tunica vaginalis together & obliterate the Cavity. Dr Hunter thinks that there is but little difference between the Seton, Caustic and Incision for the Radical Cure of the Hydrocele, but of the three, he would rather prefer the Caustic. The objection to the Seton is the great pain and Inflammation, but these are never known to kill. The Incision into the Tunica Vaginalis has been known to fail. The Caustic never has & is the most preferable Method of the three, and the Patient will more readily submit to it than be cut; a little piece about the size of a Silver penny or a Sixpence is to be applied to make an Eschar, and afterwards nothing but Poultices of Stale Beer & Oatmeal are to be used.

Diseases of the Testicle

Lecture 79th

The Varicocele is an Enlargement of the Spermatic Vein and is often exceedingly painfull; by pressing on the Vein, the Swelling disappears, & when the pressure is removed it returns. It is confined to the Vein without the Abdominal Ring: there is no cure for it. It may be eased by suspending the Testicle in a Bag Truss: The Greek Surgeons tied the Varicose Vein above & below with a Ligature, & then cut away the Varix. This method cannot be objected to if the Case is bad, for the Blood will be brought back from the Testicle by other Veins, & the Function of that Gland will be no ways impaired. The Sarcocele or Swelled Testicle happens from many Causes, & when it has continued a great while it is apt to degenerate into Scirrhus or perhaps Cancer. The Venereal Swelled Testicle is the most common disease of this part, & should always be suspended. It hardly ever degenerates into Cancer. It continues very hard a long time, but as Mercurials are taken it gradually disappears; The Epididymis continues hard the longest, if neglected it often Suppurates. The worst case of an Indurated Testicle is that from a blow, or that which comes on gradually from no apparent cause, especially if it were indolent & without pain at first, for then we judge it to be a Scirrhus, which is liable to grow Cancerous. When the Life of the Patient comes to be in danger from this Scirrhus tending to Cancer, we extirpate the Testicle. We have but a very imperfect Idea of a Cancer: By Cancer we mean in general in a Vague Sense any Sore or Tumor with great pain, which has a tendency to destroy a Patient, especially if it be situated in a Glandular part. It may be produced from a disease in a part, or is Locally situated, as

a small

Diseases of the Testicle

a small hardness in a Woman's Breast left there after Inflammation has subsided, or in the Testicle. It produces a Juice peculiar to itself which we may call Poison. Then the Disease will be local, & if we entirely cut away the part, before the Constitution be poisoned we save the Patient. There is another kind of Cancer which seems to be Constitutional, there is a disposition in the Habit to Cancer; here cutting off one diseased part will be no protection to the Patient, for the whole Constitution is poisoned, & the Poison will make its appearance in other parts. It is much to be lamented that we don't know how to distinguish these two Cases: If it came from an external Cause that we are acquainted with, as a blow for instance, there is great reason to think that it is only local, if it came from an internal Cause we don't know, it is not Advisable to cut off the part, for there is reason to imagine the Constitution is affected. If the Testicle is ever so much diseased, if the Cord is Easy & soft, it will be best to Castrate, for then we presume that the Disease is local. If the Chord is also diseased, hard, and painfull, & when the Patient lies down & the Testicle is supported, there is pain running up to the Back, it will be to no purpose to castrate, for the Poison is probably diffused thro the Constitution. Sometimes one part of the Testicle becomes Cancerous, Sometimes another. As the Extirpation is not a very dangerous Operation, & as one Testicle will answer all purposes; it will be better to take it out a little too soon than to wait, if it is already Scirrhous, for if the Cancerous poison should get into the Constitution, it will signify nothing our doing the operation. The Operation of Castration is very Simple; it is only dissecting out the Testicle, & cutting the Chord at a proper height. Some have proposed to take out the

Testicle

Diseases of the Testicle

Testicle along with a piece of Skin of the fore part of the Scrotum, Others only to take out the Testicle — If the Tumor is not very large, & the Skin is perfectly sound, there is no reason for taking away any part of the Skin; if the Tumor is large, & the Skin ~~[illegible]~~ Diseased & united with the Subjacent Testicle, it will be better to remove it, Otherwise, as it would be more painfull than one Incision thro the Skin, we should let it alone, & take only the Testicle — We should make a longitudinal Incision the length of the Tumor from the Ring downwards, then dissect backwards on each side of the Testicle & then dissect it out from the Scrotum which is an easy thing, & clear the whole from the neighbouring parts, to the upper part of the Chord — Some direct us to dissect out the Spermatic Chord first, then tye it & cut it off, & then dissect out the Testicle — But it is a good way to cut this last; Surgeons have differed with respect to the Treatment of the Chord; Some chuse to tye it with a Ligature, Others used two Ligatures, particularly the Old Surgeons, who were always afraid of Blood — Some put a Ligature round the whole Chord — Mr Le Dran took up an Idea that all the bad Symptoms happening after this Operation were owing to tying the Vas Deferens, favouring the Old notion of its being a Pars Nervosa — therefore he directed us to separate the Vas Deferens, & tye the rest only — This however appears to be of no consequence, if any we should avoid the Nerves, which we cannot do for there are many Filaments; He directs us too, if we wish to avoid a Ligature, to bruise the Artery with One Thumb & finger, & if it should bleed sometime after the Operation, then we may use a Ligature — The Artery does not appear to be of that consequence as to require tying, especially as we can make pressure upon it against the Os Pubis — We may cut the Chord without making a Ligature, & take such means after: :wards as shall appear to be necessary — Mr Sharp was fond of stitches & used them

used them to unite the Lips of the wound in the Scrotum, by the first intention but as Suppuration generally goes on, they will only lie in the way, it is best to leave them alone to suppurate & heal of themselves — — —

Urinary Complaints

Strangury is owing to many Causes: the most troublesome, and most common is the Stricture in the Urethra — There may be a Suppression of Urine when there is none in the Bladder, the disease is in the Kidney so that no Urine is secreted, or there is a Stoppage in the Ureters; But the Retention of Urine in the Bladder is the subject of our present consideration, — From whatever cause the Urine is detained in the Bladder, so as to become alarming, the Warm Bath is of Service & often makes the Patient pass Urine immediately; if this dont do, or if we cannot get at a Warm Bath — we should endeavour to introduce a Bougie very gradually, when it has been in the Bladder a few minutes, we should withdraw it, & at an instant a strong call for making Water comes on, the Urine will follow the Bougie, but very slowly tho' — If we cannot get a Bougie in (which will occasion less mischief than a Catheter, & therefore should be tried first) we should endeavour to get in a Catheter either stiff or flexible, imperforate at the End, but with perforations at the sides of the End, the perforations should be small & a number of them, for the edges of the large holes hurt the Urethra & when the Cathr comes out there are always Clots of Blood in the holes — If the Urine is slimy we may then use one with large holes — When Clots of Blood are left in the Bladder they become less & less by a kind of putrefaction, & are discharged thro' the Urethra from time to time — Any one not accustomed to the introduction of the Catheter had better use a flexible one, but to one practised in it, the stiff Catheter is best, for the direction of its point can be varied with certainty — If there is any

is any difference, we should first use a Bougie, & if that wont do, then the Catheter — We should keep the Curve of the Catheter to the Patients body from first to last, as we introduce it, for by keeping it in one direction the Urethra will be less liable to take any turn — If there is any difficulty of Introduction we must raise the end of the Catheter with the finger in Ano: and at the same time pulling out the Perinaeum to make the passage as straight as possible — We must rather use continuance than force in our endeavouring to get it into the Bladder — In Suppression we should make use of Clysters of the Anodyne kind before we use the Catheter, for the irritation from this Instrument always increases the complaint in the Urethra, and after unsuccessfull attempts by the Catheter have been made, we should again have recourse to them & always keep one in the Intestines — If every thing proves ineffectual & the Life of the Patient is in danger, we must puncture the bladder — Some have thrust a Trocar into it just over the Ossa Pubis, which might easily be done now, that the Bladder is exceedingly distended, and they have directed the Canula to be left in, till the Urine has found its proper course — Mr Sharp punctured the Bladder above the Ossa Pubis & left in the Canula, but soon after the Patient complained of great uneasiness continually purged Water & died — Upon opening the body they found that the Canula had by degrees worked its way thro' the other side of the Bladder into the Rectum, where it kept up a constt: and irritation, which was the means of his purging Water as he did — Others have stabbed the Trocar into the Bladder from the Perinaeum. The modern Surgeons dislike the puncture above the Pubis, and do it at the Perinaeum so as to wound the Bladder near its Orifice: As the Trocar

Urinary Complaints

Trocar rather stretches than cuts the depth of Flesh between the Skin of the Perinaeum and the Bladder Mr Gill proposed making an incision as we do in cutting for the Stone, tho' not so large, so as almost to lay the Bladder bare, and then thrust in the Trocar, and by this means he conceived that the Irritation from the Canula being left in would be less, because less Flesh would be stretched this the Dr thinks is the most promising method of any that has been proposed — A Surgeon at Lyons has proposed to puncture the Bladder from the Rectum with a curved Trocar, and he says, that the small Wound produced by the Instrument in this part will not remain Fistulous — But all Wounds from the Bladder into the Rectum that Dr Hunter has seen, whether small or great proved Fistulous — and besides this there will be very great danger of injuring the Vesiculae Seminales — and therefore he would by no means recommend this Operation — Whatever method we would wish to use when the Complaint arises from an Enlarged Prostrate Gland, we are obliged to do it above the Ossa Pubis and there alone, for the Enlarged Gland often fills up the Pelvis, and thrusts the Bladder out of it — In Strictures of the Urethra we can do very little good farther than the drawing off the Urine when it becomes troublesome — Force is improper for we may easily make a road — Escharotic Medicines are not to be used, we should use innocent

Bougies

Bougies, go on gradually delating & if we once get into the Bladder we must proceed cautiously & increase the size of the Bougies by deg: :ees, & after we have made the passage pretty free, the man must have recourse to a Bougie at times, perhaps for all his Life: his Life will thus be made comfortable, & a relapse prevented. After the Bougie has passed the Stricture & lain in the Urethra for sometime, when it is withdrawn, we generally see the mark where the Stricture pressed upon it. Fistula in Perinæo commonly owes its Origin to an Obstruction of the Urethra from Stricture, therefore we should begin the Cure of the Complaint by first opening the stricture; when the passage is opened, the Urine takes it's Old Rout, & the Fistula closes up. When a Stone sticks in the Urinary passages there is an Effort rais: :ed by nature, which pushes it on farther. When it has passed the Prostrate Gland it gets into the membranous part of the Urethra, and then into a wider part of the Canal, the Bulb, here it comm: :only sticks, the passage from hence growing smaller; If there is a probability of the Stone's passing we must encourage that disposit: :ion by the Warm Bath, and inject some Oil into the Urethra, and if it moves a little, it generally passes quite thro'. If it be within reach the Surgeon should loosen it with a Probe, or endeavour to draw it out with the Canula Forceps. If these methods do not succeed we must cut the Stone out of the Urethra, differently according to the different Circumstances. Some draw the Skin a side sideway before they cut upon the Stone, so that the External Wound may not correspond: with the Wound in the Urethra, & thus prevent the Urine ~~&~~ running thro' & occasioning

occasioning a Fistula. But this instead of being the ready means of preventing a Fistula is the ready means of creating one, for a little water getting thro' the internal wound not being able to escape by the External, will occasion Inflammation & Suppuration, from its lodging in the Cellular Membrane, the consequence of which will be a Fistula. The best way is to cut thro' all upon the Stone with the Skin in its natural Situation, then put a Catheter into the Urethra, make a Couple of fine stitches thro' the Skin of the wound, and include a little of the Substance of the Urethra — If it be in that part of the Urethra, which is under the Scrotum, we must endeavour to get it farther backwards, or forward: if this can't be done, we must cut it out at the lateral part of the Scrotum. It will be better if possible to get it backward, & turn up the Scrotum so as to cut behind it to avoid as much as possible a depending drain in the Scrotum. When a Stone is in the Urethra at the Prostrate Gland, we must cut upon it as an extraneous body, we must introduce a Finger into the Rectum, pull the Stone forward & outward so as that it may project at the Perinaeum, & cut upon it as in cutting upon the Gripe — —

H

Empyema Lect, 88

Empyema

Lecture 80th

The making an opening into the Cavity of the Chest to discharge any Fluid is called the Empyema — In France the Surgeons have made use of a Trocar to perform the Operation for the Empyema, but Dr Hunter says it is a very dangerous experiment, the safest way is to make use of a common sharp dissecting knife, and we should use this exceeding cautiously, feeling as soon as we have cut down to the Pleura whether we can discover a fluctuation or tumescence; To do this we should desire the Patient to cough keeping the finger still against the Pleura — In letting the Matter run out we should compress the ribs that no Air may be sucked in, and we should make the Patient breathe only with one Lung, when we have let out as much Matter as will be necessary at one time, we should draw the Skin over the internal Wound & desire the patient to make a deep inspiration & draw his ribs upwards; by this means the external Skin will serve as a Flap, & prevent the Admission of any Air — As soon as the Cells are a little more expanded by Respiration, we may then open the Wound & let out the remaining Matter without any danger of the Patient's fainting, & lastly we should cover the whole with a piece of Sticking plaister that will adhere very strongly & keep the parts in that situation in which they are placed, viz with the external Skin acting as a Flap to the internal Wound thro' the Pleura into the Cavity of the Thorax —

In doing the Operation for the Empyema we must make the Drain as depending as possible; we should rather make the Opening on the side of the body a little away above the Attachment of the Diaphragm either

between

between the 7th & 8th Rib, or between the 6th & 7th — The Incision that is made must be parallell to the Ribs, rather nearer the lower than the upper Rib, to have a better chance of avoiding the Intercostal Artery, and having laid the Pleura bare, we can more certainly determine whether the Chest contains a Fluid by the Fluctuation — If it does, we may open the Pleura either with our nail scratching it, or with the point of a knife, keeping still nearer the lower Rib — If there is any fluid, it immediat:ly rushes out; if there is a large quantity we had better let it out at different times than at once, this will perhaps prevent a fatal fainting which Mr Gill saw follow immediately upon the discharge of a large quantity, for the Lungs having been long pressed together cannot expand themselves readily upon the removal of the pressure, hence the Patient faints & perhaps dies — Every time the Patient inspires we should close the Orifice to prevent Air from getting into the Cavity of the Chest, for air might probably do the same mischief as the Fluid did — We should let the Fluid rush out in Expiration: a piece of sticking plaister laid on the Wound will serve the use of a Valve, the Fluid will be forced out in Expiration, but in Inspiration the plaister will be sucked up against the Wound & prevent the air getting in — Generally the Patient dies after the Operation because the Wound cannot be healed by the first intention, internal inflamm:ation & Suppuration come on, which by diffusing themselves over the Chest destroy the Patient, tho' many People have talked of doing it with as much indifference as opening a common Abscess — It freque:ntly happens that Matter is contained in a kind of Cyst formed by Adhesion of the Lungs to the Pleura; Dr Hunter never saw it but once in the

Empyema,

in the general Cavity of the Chest, Pleurisy & Peripneumony gene:
:rally go together, the inflammation is communicated from one part
to the other, the Matter formed seldom makes its way externally, but
generally forces into the Cavity of the Chest, & makes Empyema, or
into the Trachea & occasions Ulceration & Pulmonary Consumption.
Generally Speaking, Inflammation & Suppuration is found to possess
the upper back part of the Lungs under the Shoulder blade more than any
other part. A Characteristic mark of the Matter's coming from the cavity
of the Thorax in a Tumor which appears Externally on the Ribs, is a pro:
:trusion of it on coughing, & in this case we ought to open the Tumor
& let the Matter out immediately. When Nature does not point out the
Matter in this way, the Dr thinks that the Operation should not be
performed, for in the first place, we dont always know when there is
matter, & secondly if there is Matter, we dont know exactly to what parti:
:cular part it is confined, & moreover the Patient generally dies.
The most common Fluid discharged by this Operation is Matter, another
frequent kind is water. a Patient affected with Hydrops Pectoris com:
:monly wakes hurried & frightened from his first Sleep; his Viscera
are unsound, & the Operation will do nothing more than ease him of
his present Load, the water will collect again if he lives long enough;
We must always be uncertain of the existence or nonexistence of a
Collection of Fluid in the Cavity of the Thorax, therefore we should never
use a Trocar. Another kind of Fluid, (but seldom met with however)
is Blood, for when so much Blood is shed into the Chest as to cause
difficulty of Respiration, there is such Mischief done internally, as to
kill, & the Surgeons of the Army & Navy say, that these Cases always end
in Death. It has been recommended at Edinburgh to do this operation for
the discharge

Empyema

the discharge of Air — air will seldom be confined in the Chest of a Person that can live, for it generally gets in from a wound of the Lungs, which is almost certainly fatal, & besides it happens commonly from a Sword or Ball, so that there will already be an external Opening; When a Rib is broken, a Spicula of Bone might wound the Lungs & thus Air get into the Cavity of the Chest, but here the Air gets into the Cellular Membrane likewise by the Wound thro' the Pleura, & is diffused over the whole body, & if we let it out from the Cellular Membrane we let it out from the Chest at the same time — the only case where it can get into the Chest alone, is when a Spicula has wounded the Lungs, which being replaced & the Pleura being but little wounded, acts as a Valve before the opening into the Cellular Membrane — when only one Lobe of the Lungs is diseased, the Patient commonly lays easiest on that side, because the Lobe is in a manner useless, while the other has more room to perform it's Functions

Amputation of the Breast

The Breasts of women often inflame & suppurate kindly after Child: : birth; it is a general rule in such Cases to apply Poultices, and let them break of themselves, if in two places or in twenty it is the same thing; we should do nothing Else, only press the Breast when a fresh Poultice is applied for the sake of Cleanliness, & let them heal their own way, which they will do tho' much hardness remains; — The Glandular part of the Breast will often feel very hard in comparison to the other parts of the Breast, so that we should not always conclude hardnesses here to be of the Scirrhous kind — Tumors however proceeded from blows, and Scirrhous hardnesses coming of themselves are extremely dangerous, & ought to be particularly attended to in these Lumps should be removed

Amputation of the Breast

removed early especially if they come on in the manner we mentioned last viz of themselves — There is no doubt but there are sometimes hardnesses in the Breast, which even men of great Experience have supposed to be extremely alarming, & yet have been cured by some old woman or other in the Country, from only the use of Emollient Fomentations, so that we should never be too positive in our Prognostics — nor neglect the attendance of what at first sight may appear to be incurable — If we open the Abscesses, tent them &c we shall only make bad worse — a woman, who has had a Milk Sore once is not the more liable to have it again on that account — Dr Hunter never knows of a Milk Sore terminating in a Cancer, he says, they always do well — As we dont know what a Cancer is, we cannot properly define it — The Progress of one on the Breast is generally as follows, first the Nipple is drawn inwards & tucked deep, then a hardness may be felt around it, the Skin is puckered in, and fixt to the Ribs, all the Flesh is hardened & contracted, whether it ulcerates and bleeds, or not, it is called a Cancer — so that we shall call that a Cancer which goes on to destroy the Patient — whenever the malady appears to be local, there are great hopes from Extirpation — If the malady is general, it will be only torturing the Patient, and bringing a Disgrace on Surgery to take off the Breast; if it is fixed to the Ribs we cannot take it off, and if the Glands of the Arm-pit are affected, it is impossible to cure it, unless we can take them out also, therefore if they can be extirpated without danger, they

always

always should. The Poison being absorbed from a Cancerous Ulcer the Lymphatic Glands thro' which they pass will likewise be inflamed and the red marks go on into them, and in this Case taking away the Breast will be attended with no Advantage, as a tainted part will be still remaining. As much Skin as safely can must be preserved, it should therefore be begun above & carried downwards. What Bleeding there is, comes in the direction from the Axilla which may be stopped by Ligature; there is some bleeding also from the Mamillary bran: ches, but these generally require no particular Attention. After the Breast is removed, the Surgeon examines whether any diseased part remains behind, & if there does he cuts it out; which is generally toward the Arm: Pit. we are directed to make an Incision in the Skin, & dig them out, but this is hardly Adviseable. The Operation should be performed easily & largely in the direction of the Lympha: :tic Vessells, & no other Instrument than a common dissecting knife will be necessary. the Breast should be Amputated before we take out any diseased Gland in the Axilla, for the Skin being cut up a little towards the Axilla will enable us to remove the Glands with much more Ease; the Arm should be drawn in, as near the body as the Operation will admit of ——

Embalming

Lecture 81st

We generally have 3. Boxes, one for the Viscera, One for the Brain, & one for the Heart besides the Coffin for the body — The Bowells should be taken out, & clean washed in several waters, Wash all the internal Surfaces of the Body, dry all with Sponge & Cloths, then wash the whole (after the Blood has been washed out) with Camphorated Spirit of Wine. There are two Powders usually Employed, a coarse One of sweet smelling Herbs, & a fine One of Cinnamon, Nutmegs, & other Spices — The Viscera are to be put into a Box, which is to be filled up with One of the powders, then a bottle or two of Camphorated Spirit of Wine is to be poured into them, & they should then be soldered up. In doing the Heart, the Ventricles & Auricles should be filled with Powder, & it should be put with the apex downwards — The Skull must be filled with Powder & some must be strewed between the Scalp & the Cranium — The Abdomen, Thorax, & other Cavities must be filled with it, all must be well wet with the Spirit, & then be sewed up. The Body must be wrapped in a Cere-Cloth made of a Sheet dipped in a Melted Composition of any colour; the best thing will be an Oiled Cloth, or Oiled Silk bespoke for the purpose; a little of the fine powder may be sprinkled over the body before it is wrapped up, the Whole is to be packed up with any coloured Tape we please, beginning at the head & going downwards. As much of the mould of the Limbs as possible should be preserved — If we only wish to preserve the body, as soon as we can decently, we should open the Inguinal art: or that in the Arm & inject the Vessels of the body quite full of Camphorated Spt of Wine: next wash all the parts very quickly & dry them with Sponge & Cloth; & inject the Arteries of the Arms & Legs from their Trunks with the Spirit: Use powdered Rosin instead of the other Powders, & pour thereon plenty of Spt of Turpentine, the Rosin will be dissolved by the Spirit, which evaporating by degrees will leave the Whole cemented together; then as before directed; thus we may preserve the body some time

Lithotomy Lecture 82d

Lithotomy

Lecture 82^d

Celsus, & therefore probably the Greek Surgeons recommended this operation in Boys of a certain Age only – Celsus describes the Opera:tion thus: a Finger or two are to be introduced into the Rectum to draw the Stone towards the Perinæum & make it project there, & then cut it out as one would a Boil; The precise Manner in which the Incision was made, is not known; but Paulus Aginetta directs us to cut upon the Stone a little to the left of the Raphe, & till 150 years ago this method was universally practised; the Knife & the hand were all that was necessary – It was called Cutting on the Gripe, probably because the Stone is first griped & then cut upon – it cannot be done upon Adu:lts & very young People – The greatest Objection to this method is that we cant cut with Certainty, & we know that after this Operation the Patients were generally improlific, the Seminal Ducts being cut thro; Besides the Coats of the Bladder must be hurt by the Gripe, especially if the Stone were a rough One – Johannes de Romanis was the Inventor of the greater Apparatus: His Scholar Marianus Sanctus published it in 1524 – Johannes introduced a Grooved Staff into the Bladder, made it project at the Perinæum, & cut upon the Groove in the Bulbous part of the Urethra, then he introduced the male Conductor into the Bladder by means of a Process that slipt along the Groove, withdrew the Staff & introduced the Female Conductor, between the Conductors after he had stretched the Urethra by opening them, he passed the Forceps into the Bladder, withdrew the Conductors & extracted the Stone; so that he stretched & tore the membranous part of the Urethra, which was the Cause of great Mischief – Peter Franco, a Provincial Herniary &

Lithotomist

Lithotomy

Lithotomist published a Book on Hernia about the middle of the 16 Century, In this Book he tells us, that having cut a Boy for the Stone, he found the Stone too large for Extraction at the Perinaeum, then chancing to lay his hand on the Pubis he felt the Stone, he immediately cut above the Pubis into the Bladder, & took out a very large Stone; This case proved Successfull, but we dont find that he ever practised it afterw: :ards, ~ After this Rosetees a Frenchman published a Book upon the Caesarian Operation, & herein he recommends the High Operation for the Stone (as this Method of Francois is called) but it gained no reputation in Europe till Mr John Douglass Brother of Dr Douglass the Anatomi: :ist practised it with some Improvements, which was as follows; He to avoid more certainly a penetrating Wound into the Abdomen by wounding the Peritonaeum, injected an innocent fluid, such as Barley Water into the Bladder to distend it & make it rise up above the Ossa Pubis considerably, he then cut longitudinally thro' the Integuments down to the tense Bladder so as to lay it bare, then plunging in a small knife with the back turned towards the Os Pubis he slit the Bladder upwards, thrust in his finger to keep open a passage for the Forceps, which he introduced & extracted the Stone ~ The Objection to this was, that the Bladder could not be raised always sufficiently to enable the Surgeon to cut clear into it without wounding the Peritonaeum & therefore the Patients generally died; It happened every now & then that the Peritonaeum was wounded so that the Bowells came out ~ Another Objection was, that there was not a depending drain for Gravel or small pieces of Stone that might be broken off by the Forceps, & for Matter; another Objection & a very material one was that the Urine insinuated itself into the Cellular Membrane above the Os Pubis, & occasioned Internal Suppuration & Fistula ~ This method

Lithotomy

method was found very inconvenient, & is now laid aside. Mr Thompson observes that it cannot be practised in Grown People, but may in very young Creatures, for the Fundus of the Bladder in a Fœtus is as high as the upper end of the Os Sacrum, & gradually falls lower & lower as we grow up. — Frere Jacque a Monk came to Paris & there published the lateral Method & performed several operations, & had an Order from the King of France, that his Physician & Apothecary should attend his operation, & examine the bodies after:wards, & report to him what parts were cut in the Operation & how far he had a right to encourage him. — The report these People made to the King was not a very favourable One, they said the operation was a very random One, but that it might be much improved. — He used a Staff at first without a Groove, plun:ging a long knife, between thro' the Perinaeum the Anus, & the Tuberosity of the Ischium into the body of the Bladder; till he met with the Staff, and then cut upwards towards the Peri:naeum. — Some of his Patients lived & some died, but it was found that he cut so much in the Dark and so differently, that his Oper:ation was not alike in any two Cases, he often thrust the knife thro' & thro' the Bladder: Mr Cheselden first used the lateral Method in England, after that Professor Rau had used it with great reputation in Holland. — Mr Cheselden making the Staff to project on the left side of the Perinaeum midway between the Tuberosity of the Ischium & the Verge of the Anus cut into the Groove, then turning the edge of the knife upwards, he felt for the Staff in the Body of the Bladder alr:eady nearly laid bare by the first Incision, cut upon it by keeping the

Rectum

Lithotomy

Rectum aside with his finger, & continued the Incision thro' the Prostrate Gland to the first Incision in the Bulb of the Urethra & introduced a Gorget to conduct the Forceps into the Bladder. This is the Account he gave of his Operation: But he did not cut so far back into the Bladder as was generally imagined; he might cut a little of it, but the greatest part of the passage was torn thro', & he often wounded the Rectum. Another Surgeon proposed to turn the back of the knife into the Groove of the Staff after the first incision & thus push it on into the Bladder, but by persisting in this way the Rectum almost always was wounded, so that if the Patient recovered a Fistula remained; and another Accident which happened to him & Mr Cheselden was this, the cutting thro' the Seminal Ducts which had the same Effect as Castration. Mr Le Dran proposed an Instrument to be thrust along the Groove of the Staff into the Bladd:er, which cuts the Prostrate Gland sideways & avoids the Seminal Ducts. This is a good Instrument, but Mr Hawkins's cutting Gorget is better, because it makes one Instrument less necessary, & the Incision made by it is much the same as the Other, for after Mr Le Dran's Instr:ument had cut, a conducting Gorget must be used to conduct the Forceps into the Bladder. Now Mr Hawkins's cutting Gorget is a sufficient Conductor. The Forceps are always made not to shut quite close, when they are slipt into the Bladder upon the Gorget, the Gorget is taken out, the Operator then opens the Forceps to grasp the Stone: Now it sometimes happens, when a Surgeon can feel the Stone very distinctly that he can't catch hold of it, in this case it is owing generally to the Forceps being introduced too far & therefore we should withdraw it a little, & indeavour to lay hold of it with the Extremity of the Instrument; in this way we shall

very frequently

very frequently succeeds as the Extraction of a large Stone must inevitably be attended with more or less Laceration of the parts, we should use no more Violence than is absolutely necessary, but pull gradually drawing it from side to side, from the fore part to the back part untill we have got it away. Small Gravel remaining should be taken away by the Scoop which has a groove in it the better to introduce the Forceps to take away any thing that may be left, the other End will frequently serve when the finger is not long enough. In our present lateral Method we use Mr Hawkins's Gorget which cuts on the left side, because the left side of the Perinaeum is generally chosen: It should not be push:ed too far into the Bladder, least the Beak should go thro' the oppos:ite side of it — When We operate on a Woman, the Labia are thrown aside, & a grooved Director introduced into the Bladder, then introduce a small Gorget by means of the Groove, withdraw the Director & introduce a larger Gorget upon the first, open the Gorgets to dilate the Urethra & pass the Forceps between them into the Bladder, take away the Gorgets & extract the Stone, but in this way we always lacerate the Urethra, which occasions incontinence of Urine, & perhaps Fistula opening into the Vagina: it is better therefore to cut the Urethra. Mr Hawkins does this with his Cutting Gorget introduced by a Female Grooved Staff, & as it slides sideways it does not make any Communication with the Vagina; the wound being a Cut, ends well or at least much better than a lacerated one, every thing is commonly as well as before. When the Bladder contracts it is possible that it may live upon the edge of the Cutting Gorget & be wounded thereby, this being kept in the Bladder all the while the Forceps are introducing. Dr Hunter advises therefore to withdraw the Gorget as soon as it has cut into the Bladder —

Amputation of the Penis

Lecture 83

In performing this operation we should endeavour to preserve as much sound Skin as possible. Before we operate, the Skin should be drawn rather backwards, then as much of the Penis may be dissected off as is diseased. Some advise tying the Artery after the Operation, but Dr Hunter thinks a sufficient pressure may be made on it to prevent an hæmorrhage. A piece of Bougie should be kept in the Urethra to keep it from closing up with the Cicatrix. Ruysch recommended the Penis to be tied quite round with a Ligature & leaving the lower part to slough off, but this is much worse than cutting it off, because the pain will last much longer. We should be very cautious of operating on Elderly People of Scorbutic Habits, especially if they are hard Drinkers.

Fistula in Ano

Abscesses near y Anus do not heal up so readily as other Abscesses after they break, but in general become fistulous. A Fistula always implies a Sore of long standing with a hard contracted Orifice; when the Cavity of the Abscess & Gut communicate it is called a complicat Fistula if there is also an opening externally. In this Case the Fæces are principally discharged thro' the Anus, but some always passes also thro' the external opening in the Perineum. To enlarge this opening will not be sufficient to cure the Fistula, for it will remain notwithstanding, but the Cavity of the Abscess must be laid into One with the Cavity of the Gut by an Incision. To make this Incision it has been recommended to introduce a flexible grooved Probe thro' the external Opening & push the end of it thro' just above the hole in the Intestines if there is any into the Rectum, then bring the end out at the Anus with the finger

Fistula in Ano

the finger, & cut all upon the Groove — The Modern Method is to use a narrow probe pointed Bistory only, introduced in the Same Manner as the Grooved Probe, (pushing the point thro' into the Cavity of the Gut) & drawn out with the finger behind the end in Recto, so as to divide all the parts above — Dividing the Sphincter Ani is of no consequence as it will heal kindly & perform its Office as before, M^r Le Dran used to cut out a piece of the Fistula partly from the Buttock & partly from the Gut — M^r Pott argues against this practice very strongly, but it appears that the larger the Opening has been the more certain has been the Cure — There is great difficulty to get the probe point of the Bistory thro' the Rectum & therefore it does not make so good an Operation as the common knife with the flexible Grooved Probe — An Incompleat Fistula or what has been called a Blind One, is that which has only One Opening, & this is of two kinds, one which has only an internal Opening, & the Other only an external One — In cases of Abscesses about the Anus, the D^r thinks it is best, to open them early & largely; Early because the matter will Otherwise be daily increasing, destroying the adjacent parts & rendering them hard & Callous — and largely because there will then be less danger of their becoming fistulous —

Bronchotomy

This is done to prevent Suffocation, therefore we suppose the suffocat:ing cause to exist above the Aperture we intend to make into the Trachea — This is always a troublesome & oftentimes a disgracefull Operation — In long-necked People there is sufficient room, but in short necked the Trachea lies very low down towards the Breastbone — we have the Thyroid Gland to cut thro' which is a very vascular part, & will furnish a copious hæmorrhage — In doing the Operation we first lay bare the

Trachea

Bronchotomy

by a Longitudinal Incision
Trachea, between the lower end of the Cricoid Cartilage & the Sternum, then make a transverse opening between two of the Rings, & keep a double Canula in it (which should be directed downwards) till the disease that prevents Respiration is removed, continuing to employ in the mean while the common remedies necessary for the Cure of that disease. A Double Canula is used for the convenience of cleaning the Instrument from time to time. It will at best be a troublesome operation for the Patient will suck in the Blood in Inspiration, which will set him a coughing, & what is coughed up can't easily get thro' the Artificial opening, & perhaps may suffocate him — when all danger of Suffocation is removed the wound is to be healed up. When a Person cuts his throat, the ~~—~~ Head should be bent down to the neck, to bring the edges of the wound together so as to unite, for Stitches occasion an uneasy Cough from the Irritation which they produce — — —

Wry Neck

The Dr has seen only three Cases, in which there was a prospect of the operations succeeding, & only two in which the Operation had been performed in both of which it turned out very successfull —

If the Wry Neck is owing to the rigidity & contraction of the Sterno mastoideus muscle, & to nothing Else, then cutting that muscle will set the neck to rights. The safest place to do it at is to cut the muscle thro' just above the Clavicle & here the Scar will be less disagreeable — we should do it very cautiously, & when it is done we should keep the head in the natural position, or even rather tending to the sound side. When a Wry Neck has been of long standing, the bones often take the Curve in which Case the Operation can be of no Service — — —

Extirpation of Tonsils &c

Extirpation of the Tonsils & Uvula

Lecture 84th

The Tonsils & neighbouring parts are sometimes much swelled from Cold, & often One or both Tonsils tend to suppurate, but these Cases are never dangerous, because before the Tonsils are so much swelled as to endanger Suffocation; a Lancet may be thrust into them, which will discharge the Matter if any is formed, & if not the Bleeding will lessen their size — When the Tonsils are enlarged they occasion a disagreeable thickness of Speech, & labouring Respiration, & the Patient commonly sleeps with his mouth open — We know of no process that will reduce these Glands to their former size, & as they never become Cancerous they should be extirpated — The Tonsil must be drawn out with a hook double with both prongs pretty broad, that they may not tear out their hold, run into it, & cut off with the Tonsil Scissars, or we may cut it off with a small knife beginning below from the Tongue & cutting upwards; for if we cut from above downwards the Blood will ~~ob~~ obscure everything, that we shall not be able to bring the knife out below, & avoid the Tongue — If we make use of a knife it should be a very narrow One — Mr John Hunter makes use of a pair of long straight Scissars in preference to a pair of Tonsil Scissars; he lately extirpated one of the Tonsils of a Foreigner in this manner with Success — Another Way is to tye a Ligature very tight round the Basis of the Tonsil, or if the Basis is not narrow enough, to run a double Ligature thro' its middle, & tie the corresponding threads One on each side; in both cases the Circulation being intercepted wholly the Tonsil will slough off — The mouth should be kept open by placing a bit of Stick, covered with Rag in the Corner of the mouth — Some have objected to the Excision of the Tonsils on account of the hæmorrhage, but Dr Hunter says it never proves dangerous — Another method is to

bruise

Extirpation of the Tonsils & Uvula

bruise the Tonsils & get rid of it by Suppuration; this will do when we cannot perswade a Patient to submit to the Other Methods & may easily be done by a pair of Forceps — When the Uvula is enlarged & hangs down the Throat, & occasions difficulty of Breathing, uneasiness & Cough, which can be remedied by Extirpation only; so much as is above the natural length should be cut off: Some have recommended a Ligature to be tied round it very tight, & make it slough off, others to destroy it with Caustic, but these Methods are hardly practicable, in a Throat too ticklish a pair of long Polypus Forceps to take hold of, the Tonsil Scissars to cut it off is all that we want — Mr Arnauds Instrument does not do so well, it is apt to leave a small part undivided & another disagreeable circumstance, is that the part which is cut off will frequently fall down the Throat & be swallowed — Dr Hunter never saw but two Cases that required the Operation — no great Hæmorrhage need be feared —

Tongue tied

It is a Vulgar Error that Children are commonly born Tongue tied, it is a case which happens very seldom: nurses suppose that the Clucking of some Children is a Sign of their being tongue tied — The Dr says that he dont know that ever he saw three tongue tied Children in his Life: nurses are continually supposing they are, especially if they do not take the Breast & suck kindly — If the Tongue can be brought over the Gums or Lips we may be assured that the Child is not Tongue tied; when the Tongue is tied the Frænum may be snipt with a pair of Scissar, it should be done cautiously a Vein cut under the Tongue may be of bad consequence from the Child continually sucking it —

The Hare Lip

Children are often born with many Deformities, which we cannot account for, among these the Hare Lip is very common, & often there is a Fissure in the upper part of the Mouth, which running backwards divides the Uvula

The Hare: Lip

Uvula — When we are called to a young Child & are told that its Food comes thro' its Nose, we shall always find a Fissured Palate tho' there be no Hare-Lip; there are several kinds of this kind disease; a simple fissure of the upper Lip alone, a double fissure with a small eminence or nipple between the two; the generality of them are curable by the operation, but in some instances the division is very large, & here we cannot undertake to attempt the operation — A Fissured Palate is incurable, & the Voice is always affected as the Child grows up; when it is accompanied with a Hare Lip then the External Deformity may be cured, tho' the other cannot — Dr Hunter never heard of a Child's being born with a Fissure in the Under Lip — If the Case is favourable the operation should be performed as soon as possible after the Child is born, because the first days the Child takes but little Nourishment & in the mean time the Wound is cured — In all the cases where the Dr has performed ye operation soon after birth it has always succeeded; he advises it to be done two or three hours after birth — The Surgeon begins the Opera:tion by turning the Fissured Lip up, and dissecting it clear from the Gum to make room for the Angle of the two Incisions; then he cuts off the Callous Edges of the Fissure with a pair of Scissars at two Cuts; if there are two fissures the same is to be opera:ted, but if the middle part don't come so low down as the rest, after it is cut it must be United with the middle upper part of the two outer Edges brought together so as to make one Seam — The two Woun:ded Edges must be brought together to unite by the first intention and this should be done while they are bleeding; the Union is to be accomplished by two Pins and to make them the corner the lower pin must be put in first; then the thread must be wound round them sufficiently tight in the form of a figure of 8 beginning the first

turn

turn round the lowermost pin, to make the edges only just touch each other — Some keep the needles in Eight hours only, others two or three Days — The next day however they may be taken out in general, but this must be regulated according as we see that the Union goes on for which reason we must examine the Wound and either slacken or tighten the threads as we see occasion — Mr John Hunter recommends the common interrupted Suture in preference to the technical suture with Pins — If the Lip be divided accidentally, the edges should be brought together immediately. As we see it even in the state of Suppuration, so also should a fissure of the Alæ nasi & Eye Lid, & Ear. for the Wounds will soon heal, but not unite one edge with the other, and an unseemly Fissure will remain, which will always prove the case when the Cheek is divided if care is not taken, probably owing to the parts being so thin that the Integuments shoot thro — A Man had the Eye Lids of one Eye fissured by an Hanger without hurting the Cornea, the Wounds healed up, and left a fissure in each, he had constant Headach from the Continual Admission of Light upon the Eye, for it was uncovered unless he bound it up — The edges of the fissures were made fresh by snipping off the Cicatrices with Scissars, & brought into Contact by the interrupted Sutures, so that he was cured as we cure a Hare Lip — Mr John Hunter recommends the interrup:ted Sutures in the Hare Lip, and says they are better than leaving the needles in the Lip — When the needles are used the points should be cut off after they are put in — They should be made of Silver pointed with Steel — Tumors on the Lips that we suppose may become

Cancerous

The Hare Lip

Cancerous should be cut in the same manner as we cut the Edges of a Fissure, that is We must make an Angular Wound which must be treated as a Hare Lip — A wound dividing the lower Lip should be taken care of particularly, because if it heals & leaves a Fissure, the Saliva will continually dribble out of the Mouth ————

Polypus

Polypi are of different consistences, from a Cellular Membrane filled with to a firm Substance — A Tumor presses the Septum Narium aside as it increases so as to shut up both Nostrills — It must be pulled out either by the Polypus Forceps by the Nose, or by the Mouth, according as it presents — If we are to pull it out by the Nose, just before we close the Forceps, we should desire the Patient to blow his Nose to bring the Tumor into the Blades — If we are to extract it by the Mouth, we must desire him to draw the Air thro' the Nostril for the same purpose, & hawk as much as he can — It has been recommended to tie the Root of the Polypus, & let it slough off, but this is hardly to be done — Polypi are sometimes of a Cancerous Nature: We hardly know from what particular part of the Nose Polypi generally proceed, they have been but seldom examined anatomically after Death — the Dr had never the opportunity of seeing the inside of a Nose with a Polypus but once after Death, & that was in the Case of a Cancerous Polypus — In this the parts were so much destroyed, the bones rendered so very Carious that it was impossible to determine from whence it arose ————

Fistula Lachrymalis.

Lecture 85th

The Tears & Mucus being accumulated in the Saccus Lacrymalis occa:
:sions a Tumor externally, which do what we will generally breaks
thro' the Skin, & makes an Ulcer that will not heal. The Ancients knew
nothing of the true Nature of this disease, they thought that the bone
was unsound, which prevented the healing of the Ulcer. The Moderns
find that it is owing to an Obstruction in the Ductus ad Nasum, &
that Opening this Duct, or making a new one will cure the disease. It
often happens in Scrophulous Sores, & we cannot get a free passage into
the Nose, for as soon as we make one it will close up again. In this
Case, the Habit should be first corrected of Scrophula by Bathing, Bark
&c before any Attempt is made to open the passage. To open the pas:
:sage we must open the Sac. Some have directed the Eye to be covered
up with bits of sticking plaister for some time before the Operation, to
confine the Tears, & make the Sac turgid that it may be the more certainly
opened, but as we are to feel for the bony ridge, it is best to open it when
empty. We must avoid cutting the Tendon of the Orbicularis Palpebrarum
& cut below it, by drawing the Eye lids outwards the Tendon will rise up
conspicuous. We must feel for the ridge of the Bone at the brim of the
orbit, & within that cut downwards to the bone to open the Sac, then pass a
Probe down the Duct into the Nose to clear it, & fill the wound up with Lint
to dilate it, next day we must take out the Lint, & pass a bit of Bougie
down the Duct, & keep it in day & night. By using the Bougie for
several Days, & increasing the size now & then the passage may become sufficient:
:ly opened, then we leave off the Bougie & heal the external wound, but
the Duct is sometimes so much obstructed, that we cannot pass any thing
down it, in this case we must perforate the Os Unguis for a new passage into
the Nose.

the nose. the best Instrument to do this with is the Perforator of a straight Trocar, the point should be carried to the lower part of the Sac, rather the posterior part too, & pushing it thro' thro' the bone, the point must be directed inwards, & downwards nearly in a direction towards the Patient's Uvula, as Mr Le Dran observes. We must gently turn the Instrument about, else we shall pierce the bone precipitately, & wound the other parts in the nose, for the Os Unguis is as thin as a bit of Paper. A piece of Bougie must be kept in this opening to make the sides callous, so that a perfect passage may be formed, when it is formed, we must leave off the Bougie, & heal up the external Wound. Some have talked of syringing the Puncta Lacrymalia, which is trifling entirely. Others have recommended us to get a pipe bent at the end into the lower part of the Ductus ad Nasum from the Nose, & thus syringe it, and the Sac, but this appears almost impracticable.

Cataract

The Ancients thought this to be an Opake Film before the Crystalline Humor, which they could press down from the Humor to the bottom of the Eye; but the Moderns have demonstrated it to be an Opacity of the Crystalline Humor itself. they used a needle to depress the Cataract & so do we. The Opaque Crystalline is generally harder than the Sound one, sometimes it is opaque & very fluid, indeed, much more so than naturally this. The Opaque Humor hinders the Rays of Light from passing thro' it to the bottom of the Eye, & therefore destroys Vision. This defect is to be remedied by the Operation of Couching, which is of two kinds, Extraction & Depression of the Opaque Humor. If the Eye is otherwise affected than with a Cataract, if there is a Gutta Serena as well as a Cataract, the optic nerve so unsound as to be incapable of perceiving Light from Darkness, if the Iris don't contract, & dilate, & is adherent to the

Crystalline

Cataract

Crystalline Humor, in these Cases the Patient must not be couched; for after the Cataract is removed, the other Malady will remain & occasion defect in Vision, we should therefore examine into every Circumstance before we determine upon the Operation – If one Eye is good, we should never meddle with the Cataractous Eye, for it may be hurt by means of Sympathy from the irritation produced by the operation on the other, & after Couching it is a doubt, whether Vision will be bettered – If both Eyes are Cataractous, then one at least be couched even tho' the Case be not very favourable A Cataract may be distinguished from an Opacity of the Cornea by looking at the diseased Eye sideways – The Terms Ripe & Unripe Cataract are now in disuse; there being no gradual change in the Crystalline Humor – We judge of the fitness of the Operation, cæteris paribus, by the Obscurity of the Eye – We should expose the Eye to a bright Light, then move our hand before it, & if the Patient is not sensible of the different degree of Light caused by it, the operation is not to be recom:mended – To know if the Iris adheres to the Diseased Crystalline Humour we must press the Eye which opens the Pupil, then opening the Eye Lids if we cannot see the Iris contract, it is a Sign that it adheres to the Crystalline Humor – The Patient should be prepared for the Operation by an Antiphlogistic Regimen to guard against internal inflammation of the Eye, which might render every thing opake – The Eye Lids should be kept open by the fingers of the Surgeon & of an assistant; for the Speculum by pressing on the Eye Ball as well as keeping the Lids asunder has been known to press out all the Humors We can depress the diseased body – the needle should be thrust into the Eye a little way behind the Ciliary Processes, so that we shall go thro' a little of the Vitreous Humour, but by so doing we shall more

certainly

certainly avoid the Iris, than if we thrust it in a little before the Ciliary Processes — a flat pointed needle will not be so apt to pass thro' the Crystalline, without carrying it down as one that is not flattened — It must be thrust in with the flat Surface backwards & forwards, & when we see it is got into the Crystalline, we must turn it upwards & downwards — We must gently shake the Crystalline, & thus endeavour to carry it down to the bottom of the Vitreous Humour; if it should break, we must catch hold of it again, & thus depress every piece of it; if it should rise up again we must press it down again till it remains where we would have it; then we must turn the needle & draw it out as we introduced it, least we pull up the Crystalline again — If we extract, we should make a Wound in the Cornea just before the Iris; it must be sufficient to let the Crystalline thro', which will be to cut it nearly half thro'; the knife should be thrust in at one side & out at the other & then moved carefully to & fro' till it cuts it's way out; we must just scratch the Capsula with the point of the knife, & then the Humor will be easily pressed out of it's Capsula, which remains fixed to the Vitreous Humor, without pressing out any part of the Vitreous Humor; for if we endeavour to press out the Crystalline without having first punctured the Capsula, it is ten to one, but that the force necessary to do this presses the Vitreous Humor out also along with the Crystalline enclosed in it's Capsula, that wish to laceration, & whether we puncture the Capsula first, or do not, it never comes out along with the Crystalline, but remains in the Eye upon the Vitreous Humor; so that it is best to puncture it; We must be careful in making the Excision, that we don't injure the Iris with the slightest touch of the Instrument — Whether Extraction or Depression is the most preferable Method has not as yet been determined —

Trepanning

On Trepanning

Trepanning is cutting out a Circular piece of bone from the Skull to relieve an oppressed Brain — In young Bones a blow on the head often bends that part of the Skull, & if moderate their Elasticity raises them again — In Midwifery you may observe this to be frequently the Case: the Bones bend & rise again like the sides of a Tin Cannister &c. Oftentimes when the depression is very considerable, the Brain seems not in the least affected & the bone rises again, but if Symptoms of an oppressed Brain come on, the Trepan should be applied — Contusion sometimes makes a such a change in the Bone as to bring on an Inflammation of the Bone itself which often spreads to the Dura Mater & Brain — A Fracture when in a strait line is called a Fissure, when part of the bone is beat inwards, a Fracture with Depression — We say there is a Concussion of the Brain, when all the common Symptoms of a Fracture are present, and yet there is no fracture — On Dissection we sometimes find a great Extrav:asation of Blood, & sometimes no manifest change — We then say that the finer & imperceptible parts of the Brain were so disturbed as to destroy the Patient — Bleeding from the Ears, nose & Eyes, but partic:ularly from the Ears are common Symptoms of a Fracture — Vomiting is also a common Attendant on an oppressed Brain from the remarkable Sympathy between the Stomach & Brain — A Contra:fracture somet:imes happens, tho' but very seldom — Depression of the Skull that affects the Brain, Contusion of the Skull communicating its Effects inwards, Extravasation of Blood under the Skull, & Inflammation & Suppuration of the Dura Mater require the Operation of the Trepan, whether there be always a Fracture or not — We must scalp as little as possible, but we should always trace a Fracture its full length by a simple Incision, tho' it should run Zig Zag over the greatest part of the Skull; this should be done as soon as possible after the injury is received, because the Patient will not bear the cutting so well after he has recovered —

recovered his senses — When the Fracture is small & the Symptoms mild Surgeons flatter themselves that nothing is necessary to be done; but Pa:tients seldom recover unless the Operation is performed — We generally use the Trephine since Woodalls time, who was its Inventor, & called it so from its having three ends (Tres fines) — the Saw should be Cylindrical or nearly so, because a Conical Saw must cut with the sides, which no Workman can make a Saw do well — It should be notched up the Sides to let the dust work out of the Groove of the bone; — The Edge should not be thick, for that will prevent our working easily — A Surgeon should never use much force with the Elevator to raise a depressed piece of Bone, but rather make several perforations to loosen it first, for if we use much force upon the Elevator, we may occasion a fresh Fracture — If any Fluid is contained under the Dura Mater, we must cautiously puncture it with a Lancet; — Cutting thro' the Dura Mater is always dangerous. When the Skull has been perforated, the Dura Mater often throws up a troublesome Fungus thro' the Opening — this may be restrained by a Sindon made of a smooth plate of Lead or any harmless Metal to the form of the Opening in the Bone, with perforations in it to let the Matter pass readily thro' —

Aneurism

Lecture 86th

This is said to be of two kinds, the true & the false Aneurism; the first is a Tumor formed by Arterial Blood from the dilatation of the Coats of an Artery — the last is a Tumor made by Arterial Blood from the Coats of an Artery being cut or torn, & the Blood diffused into the neighbouring parts — Dr Friend in his history of Physic says, that the Ancients were unacquainted with the Aneurism, but it is plain, Paul Aginetta knew it & described it particularly — The true Aneurism happens commonly in the Arteries nearest the Heart, particularly at the Curvature of the Aorta — The false Aneurism is of two kinds, Diffused and Circumscribed — When an Artery is wounded, as by a Lancet in bleeding & the wound bound so tight as to stop the bleeding externally; the Blood is effused into the Cellular Membrane of the Limb, makes the Skin black & the Limb appears like a Blood pudding. This Case happened to a Man after bleeding, the Cellular Membrane of the Whole Arm & side of the Body was filled with Blood, & the Man died the next day from the great quantity of Blood, that had got out of the road of the Circulation, which was the same as tho' it had got out of his Body. In this Case we must not expect to feel a pulsation in the parts — the Circumscribed kind is thus formed: If strong pressure is made upon the Wound in the Artery, so as to prevent the Effusion of Blood the Arm is numbed, looks livid & no Pulse is felt at the Wrist, yet as the Arm is warm, there are hopes that the Circulation will increase gradually thro' the Anastamosing branches, and the pressure is continued in hopes of healing the Artery; after some days the Ligature is removed & the Wound appears quite — But after this there

will grow

Aneurism

will grow up a little Circumscribed Tumor with pulsation, & this will gradually grow bigger & bigger, because the Coats of the Artery are not united, but only the Cellular Membrane compacted together, which not being so strong as the Coats of the Artery will be made to give way by the Jerking Motion of the Blood in the Artery upon it — So that here is an Aneurism from the breach of an Artery, & a Sac made by the stretched Cellular Membrane, & the Sac will be so similar to that of a true Aneurism, that we cannot distinguish one from the Other, unless we know the history of the Case — There is an Aneurism of the Mixed kind, the Varicose Aneurism, which is fully described in the London Medical Observations &c. — The Vein has been punctured quite thro' & thro' in bleeding at the bend of the Arm, & the Lancet has at the same time opened the Artery — the Anterior Orifice of the Vein heals up with the external wound as usual — the posterior orifice of the Vein heals up & unites with the Orifice in the Artery in such a Manner as that the Vein & Artery have a hole of communication between them, & they so united too that the Blood cannot be effused into the Cellular Membrane — The Blood flows out of the Cavity of the Artery thro' this hole of communication into the Cavity of the Vein, & is by it returned to the Heart — The pulsating Motion of the Blood dilates the Vein — There is in this Case an external Tumor, the blood does no where coagulate as in the Other Aneurism, but continues circulating — The Pulsation in this Case gives the Tumor a tremulous feel, & when the Ear is applied close to the Tumor a kind of hissing noise is heard like that of a fluid running from a large Source into a narrow Channel — It has never been found necessary to perform the Operation of tying the Artery for the Varicose Aneurism, as many

have

have used laborious exercise with this Complaint for years without any disadvantage, In all Aneurisms true or false when the Artery cannot be tyed, the Case is generally incurable. Before we do the operation, we should trye first the Palliative cure by pressure on the wounded Artery, & it has sometimes succeeded by consolidating the parts, & when the Operation is necessary, we should keep a pressure up:on the Artery for a fortnight or three Weeks before we perform it, by which means the Small Anastamosing branches will be dilated which are afterwards to keep up the Circulation. The Anastamosing branches are so numerous that the Circulation will be kept up tho' the Artery be tyed very high up. Dr Hunter is of Opinion that if the Inguinal Artery could be tied, yet the Limb would be nourished. We must never take off the Limb in these Cases, till we have given the Ligature upon the Trunk of the Artery the Trial. The extremity below the Ligature will be numbed & without any pulse for some days, but it will grow gradually warmer & warmer, a pulse will increase in it, & will in the Space of a Month or two be nearly as good as ever. It often happens that the Humeral Artery divides into two branches before it comes to the bend of the Arm. In the Operation we should examine into this, lest we tye both branches in our hurry, for the one lies close to, & immediately under the Other. If only one is wounded, & we tye both, we lose the great Advantage that must accrue from having one of them to carry on the Circulation. If only One branch is tied, we feel a pulsation at the Wrist immediately after the Operat:ion; if it is the principal Trunk that is tyed, we dont feel one for some days. When we proceed to the Operation of tying the wounded Artery, at the bend of the Arm, for instance; we apply the

Tourniquet

Aneurism

Tourniquet; then we make a Longitudinal Incision thro' the Integuments in the direction of the Artery, divide the Fascia of the Biceps, remove all the Grumous blood, & dissect down to the Artery which lies generally under the Vein, & the nerve lies to that side of it next the Inner Condyle; this should be done so as not to cut thro' the Vein if we can avoid it, tho' it is not of much consequence, — When the Artery is in view, bend the Arm which relaxes the parts, & if we cannot then readily pass the Ligature under the Artery & tie it without taking up the nerve with it, Professor Monro directs us, to put the end of the Probe into the Wound of the Artery & raise it up, that we may the more certainly avoid tying the nerve — If we cannot readily seperate the Vein, it may be tied with the Artery — The Artery must be tied below as well as above the wounded part, or an hæmorrhage will ensue; Instead of tying the Artery it has been recommended by the French Surgeons to lay a bit of Agaric or of Sponge upon the Orifice, which it was thought would by their Styptic Quality prevent Hæmorrhage, and heal up the Orifice: It has never been tried in England. — Mr Lambert of Newcastle recommends uniting the edges of the Wound in the Artery by two pins as we do in a Hare Lip, but this is such a delicate operation that it can hardly be recommended. — Compresses laid along the course of the upper part of the Artery have been used with a view to support the Ligatures, & abate the Impetus of Blood against them but they seem to be quite unnecessary. —

Amputation — Lect. 37

Amputation

Lecture 87th

Within these 140 years, (that is) since the discovery of the Circulation of the Blood, the Tourniquet has been invented, for the Ancients used no sort of compression to hinder loss of blood in the Operation of amputation, & no wonder therefore that they speak of it as a very dangerous one — Scultetus gives us an account of a Surgeon at Padua particularly famous for bleeding in the Artery at the Wrist, & says that the bleeding was stopped by pressing the Artery against the bone — He invented an Instrument to make this pressure, it was a Steel One to go round the Arm with a Screw, & Button end to be screwed down upon the Artery, but we do not find that he had any Idea of a Tourniquet for Amputation — When Besançon in France was besieged by the Spaniards in 1674 a Surgeon in the Town invented the Tourniquet, & used it upon the Wounded People there first of all, it was a Towel twisted round by two sticks, his name was Morelli, Grandfather to a Practitioner in Surgery now in that Town of the same name — The Tourniquet was first publ: :ished in 1679 by Young, a Surgeon at Plymouth, in his Currus Triumphalis, but as he uses the Word Button instead of Stick there is great reason to think that he gained the knowledge of this Instrument from the French — Petit invented the Screw Tourn: :iquet in 1718, which is the most convenient of all: Till 1714 Morelli's Tourniquet was generally used as appears from Dionis — There are four Greek Authors, who have written on amputation, for we consider Celsus as a Greek — The first was Archigenes, who lived in the time of Trajan — His writings with those of

Heliodorus

Amputation

Heliodorus were never published till lately at Florence. He says the Vessels leading to the part to be amputated are to be tied or sewed, that on some the whole part is to be bound, but dont say how; & when they fill up, the Bone is to be put on which is quite unintelligible, the Skin is to be drawn up & bound where we are to cut; then after the Incision, how which is to be done, we are not told; the news are to be drawn together & the bone sawn thro; & if there is bleeding, an hot Iron is to be applied to the Wound. This is his Obscure Account of the Operation; Heliodorus was the next: what time he lived in we dont know. Juvenal in his sixth Satire mentions One Heliodorus a Surgeon, but whether it is the same is not certain. He is short upon the Operation but is clear; He says that Amputation is more dangerous the higher it is performed on account of the Hæmorrhage, that they are Foolish Folks who divide all the flesh down to the bone at once, that he always made a proper Ligature above first, which he says is to make the Vessells swell, then he cuts down to the Bone on that side where it is least covered with flesh, then saws the bone, & at one stroke cuts the rest of the flesh & Vessells in it, and immediately applies the hot Iron. Celsus is the next, he tells us that he cut down to the bone in one part having drawn up the Skin, then drew up the flesh, cut thro' the Bone, & lastly divided all the rest; but We dont find that he used any previous Ligature. Paulus Æginetta is the fourth, he says that as sawing the bone took up a considerable space of time, the Hæmorrhage was almost always fatal; He tells us that One Leonidas cuts down to the Bone first, on the part where the most, and the largest Vessells do not lie,

not lie, then saws the bone, cuts thro' all the rest at once where the Vessels lie, and applies the hot Iron directly to stop the bleeding, which is the very same way that Heliodorus did it in. It does not appear plainly, that any One of these knew any thing of a Tourniquet, and if any One before them had used any Instrument of this kind they certainly must have known it. Albucasis recom:mends cutting off Limbs at the Joint of the Elbow, and of the Knee only, which shews that he was but an indifferent Surgeon. Under the head of Amputation, Authors generally treat first of Mortification. One kind of Mortification happens to Old People, the Cause generally exists in their Constitution, & produces its Effects so as to make the Disease go on after One part has been already cut off to prevent its Spreading; Such Cases almost always prove fatal. Another kind very different from the former happens in Young People from internal Causes. This is frequently cured, & therefore we should never give up a case of this kind. In both these Cases the Bark is the best remedy, & should be given in large & often repeated Doses. Another kind is that proceeding from Cold; this generally takes place in the Extremities of the body, and as it is not Constitutional is easily stopped. Another kind of Mortification is said to arise from the Compression of a principal Artery, but this can very rarely be the Case, because of the numerous anastamoses of Arteries. If a part is tied so that the Circulation is entirely put a stop to, it mortifies. A Man died of an Aneurism of the upper part of the

Brachial

Amputation

Brachial Artery, & upon examining the Axilla it was found, that the pouch had pressed upon the trunk so as to occasion it's degeneration into an impervious Ligament so low down as the bend of the Arm, and tho' the Artery was here compleatly pressed upon, yet the Circulation continued thro' the Limb just as well as ever — Great Contusions sometimes produce a Mortification from the bad Fever attending them, sometimes from the part being rendered totally unfit for carrying on the Circulation — When a Mortification is local, for instance when it is owing to Cold, we may determine immediately upon Amputation, yet no one would think of performing it, till a beginning Inflammation & Suppuration shew how far the part is dead — If there is reason to suspect the Cause is Constitutional, we should wait till the Mortification is fairly & fully stopped before we amputate — If a Limb is crushed we cut it off, because we judge that it will Mortify — Some Accidents however have done well surprizingly so that we should never be too fond of this operation — Amputation is also performed for some Diseases, which appear otherwise to be incurable

Amputation

Lecture 88th

In Amputating one Rule is, to preserve as much of the Body as possible, but in Amputating a Finger or a Toe we do not adhere to this rule, for be the disease where it will, we cut off the Finger or Toe at the Joint. One Objection to cutting off Limbs at the Joint is, that the Bone is there very broad, and not easily to be covered by the Skin, and another Objection is that Cartilages & Ligamentous parts are apt to inflame, slough, & not granulate kindly. There being as much Flesh at the Joints of the Fingers as at the Internodes, and the Bone not being very broad there in proportion to what it is at the Internodes, is the reason, why Surgeons adhere to the practice of Amputating the Fingers and Toes at the Joints. When we cut off a Finger, the Radial & Ulnar Arteries may be compressed by the Fingers of an Assistant to avoid a Spirt of Blood that might obscure the operation, or we may compress them by a Roller; & two compresses. The Radial runs along the fore part of the Radius near the Wrist, the Ulnar runs close on the inner side of the Pisiform Bone towards the Palm of the Hand. A little Skin should be saved: when we have cut the Capsular Ligament, before and behind, still we find the Finger dont disjoint, but if we feel for the Joint on the side with our Nail & cut the Lateral Ligament, it immediately disjoints, there will be only a little Spirting Artery on each of the Finger that will hardly require the needle. If the Flexor Tendon should start out, it must be cut off with a knife or Scissars.

In cutting

Amputation

In cutting off the Finger at the Metacarpal Bone, we cut down on each side, & saw the Bone thro', & here there will be a necessity for the Needle — The Amputating Knife should be strait & not Crooked — The Teeth of the Saw should be very small. The Catlin should be small & strait — To take off the left Arm we should stand before the Patient, if the right, behind the Patient, because with the left hand we draw the flesh above the Saw; if we stood vice versa, an assistant must draw it up, & we could not saw so close as to his hand as our own — In amputating a Limb there is no need for laying a Tape round to direct the knife — If the Skin is shrivelled & loose, we may put a Roller round it a little below, where we are to cut to keep the Skin firm, so that it may not recede from the Knife, & this appears to be the only purpose the Tape can serve — When we amputate the Fore Arm, we cut thro' the Skin & Cellular Membrane at two Strokes, then draw them up, divide all the flesh down to the Bone, divide the Interosseous parts, & saw the Bone — If the Leg is taken off just above the Ancle, the remaining part of the Leg will be always extenuated, because the Extensor muscles being rendered useless will shrink — We make the same Incision when we amputate the Arm as we do the Fore Arm — & the Operation on the lower Extremities exactly corresponds with that on the upper Extremities — Celsus's Operation for the Upper & lower Extremity (especially where it has only a single bone) appears to be a much better one than ours — The Skin & Flesh were first drawn up & an Incision made thro' them down to the bone, then the Superficial muscles were drawn up from those fixed to the bone, & then last cut thro' to the bone as high as

the place

Amputation

the place to which the Superficial ones are drawn up, & the bone was sawn thro' even with the parts last divided, so that when the Muscles & Skin were pulled down again, the bone was considerably below their surface & they made a thick Cushion when the Stump healed – The Flap Operation was invented by Young, Surgeon at Plymouth and published in 1617 along with the Tourniquet in his Currus Triumphalis: In 1691. Verduin recommended this operation – It was designed for the Leg principally but it came into disuse – Le Dran seemed to have a good Opinion of it – It has been practised lately in England by Mr White of Manchester, & Mr Bromfield in London – but whether it is better than the common method of Amputation we don't know – Mr John Hunter thinks it may do for one whose way of Life will not call him to stand or walk much, & that the Common Stump is better to them who walk or stand a good deal in their business – It was found that the Flap would not always unite with the Stump, but Mr White says, if the Wound is dressed loosely, & after the Suppuration of the Flap & Stump is fairly Established & the Granulation begun, then if the Flap is laid over the Stump they will always unite – The Amputation of the Arm at the Shoulder according to Le Dran owes its Invention to his Father, but it is plain that Morand's Father was the Author of it – They used to begin the Operation by running a large needle under all the Muscles at the Axilla close to the Bone, & tied all these with a Ligature to secure the Artery – Mr Bromfield's method of doing this Operation is tire:some, painfull, & horrible, & inferior to the present usual method laid down by Mr Sharpe – Dr Hunter was the first who recommended pressure to be made on the Artery, where it passes over the first Rib to answer the same purpose as the Tourniquet does in Other Amputations; this however is not absolutely necessary, for Dr Foot says, that when

he performed

Amputation

he performed the Operation at Bristol, he cut the Artery, but he could immediately lay hold of it & stop the Bleeding — We cut thro' the Skin & Cellular Membrane at the fore part of the Shoulder, first towards the axilla, then feel for the Artery & divide the forepart of the Deltoid Muscle, the Tendon of the Pectoralis, the short head of the Biceps & the Coracko-Brachialis, & tie the Artery along with the Vein, then cut thro' all the rest quite to the Joint, by putting the Arm close down to the side of the body, we easily cut thro' the Capsular Ligament at the top of the Joint, & then the rest is done presently — this should be done so as to save Skin & flesh enough to cover the Acetabulum Scapulae — the Axillary Vessells lie between the united insertion of the Latissimus Dorsi & Teres major behind, & the Biceps & Coraco Brachialis before — In Tying the Vessells, Some take up a considerable quantity of Flesh, Others tie only the bare Artery — It is best to tye but little flesh along with it — The Ligature in two or three days after the Operation often becomes loose, & from this Cause a Secondary Bleeding has happened, which tho' but small perhaps only a few Ounces, has occasioned a fatal fainting — This is more likely to happen when much flesh has been tyed along with the Artery — they who are fond of tying the flesh with the Artery say, that if the Artery is tyed alone, it is apt to be cut thro' by the Ligature, or to have the Ligature slip off. The Ligature should only be tyed moderately tight, for if it is drawn very tight, tho' perhaps the Artery is not divided, it often happens that the thick muscular Coat is pinched thro', & the Artery adheres only by it's inner Coat, & the Cellular Membrane on the outside of the Artery, so that in this Case it happens, that in a few days after the Operation, a Tumor is seen just at that part of the Stump where the Artery lies, which has a pulsation: this is an Aneurism of the end of the Artery for the strong Coat being divided, the inner is dilated out at every pulsation by degrees and makes a pouch, so that it will be necessary to tye the Artery again above

above the dilated part, which will be now attended with some difficulty on account of the Artery having shrunk; or perhaps the Artery is quite cut thro', then the Cellular Membrane will give way & form the Pouch. This Accident is not so likely to happen in Young as in Old People. A Young Artery is not so easily crushed, on account of its Muscular Coat being more fibrous & tough in its Texture. Mr Brom:field's Hook to draw out an Artery to be tied is a very good Instrument, particularly where an Artery bleeds at the bottom of a deep Wound, as on the side of the Prostrate Gland in the Operation for the Stone, and tying the Artery alone: when drawn out it gives Vastly less pain than tying it with the flesh as done by the Needle. It answers very well in Theory, but as it is said that if the flesh is not tied with the Artery, it is apt to cut thro', it remains a doubt whether it is so well in Practice. The tying the Artery along with the flesh & other sens:ible parts gives more pain than any other part of the Operation whatever. By tying the Artery alone in Mr Bromfield's way the pain is infinitely less. A Surgeon at St Georges Hospital tied an Artery in a Stump according to Mr Bromfield's way, & the Patient bled to Death; but then a dispute arose whether it was the Artery that was tyed which bled from the Ligature slipping off from it, or from its being cut thro', or whether it was an Artery that had not been tied, for it frequently happens that an Artery will bleed sometime after the Operation, which did not bleed during the time of it. Tying the Vessells was used previous to the invention of the Tourniquet, for we find that Ambrose knew this method of stopping Bleeding by Ligature.

The Gravid Uterus

Lecture 89th

To take a View of the Gravid Uterus in a general way we shall consider it as it appears towards the latter end of Pregnancy that is in the ninth Month — It's size is very different in different Women & in the same Woman at different Times — There is such Variety in the Bulk of the Fœtus & in the quantity of Water, that this cannot be ascertained — The Uterus possesses all the Space between the Hips — It's Fundus rises up as high in the Cavity of the Abdomen (generally speaking) as midway betwixt the Navel & Scrobiculus Cordis, but as this must vary in tall & short Women, we cannot say exactly where it comes up to, in the former it must be lower, in the latter it must be higher considering the Uterus in both to be of equal Dimensions — In Crooked little Women it often presses the Cartilages of the Ribs outwards — If we strike the Abdomen of a Woman that is Pregnant upon the fore part of the Distended Uterus, the Sound is as if we had stricken upon the thigh or any other fleshy part; if we strike on the sides of the Uterus, the Sound is hollow as if we had stricken a bladder filled with air, for on the forepart there is nothing between it & the containing parts of the Abdomen, but on the side the Intestines lie between it and the Peritonæum — These signs are not certain proofs of a Woman's being with Child, but if by laying one hand upon the Abdomen we can feel the Child move strongly in Utero, we cannot be mistaken — The forepart of the Uterus lies in contact with the Peritonæum, so that in the Cæsar:ian Section we can hardly cut or wound the Viscera of the Abdomen or any Intestine — The Epiploon will sometimes, tho' very rarely, descend before the Uterus, but this cannot be the case with the Intestines, because they are tied behind to the Mesentery — The substance of the Epiploon being mostly fat & therefore specifically lighter than the body of

body of the Uterus, seems to be the reason why it always rises above it. A Woman is seldom equally big on each side. In most Women the Child with the greatest part of the Uterus lies towards the right side, & the reason of this difference is, that as the Uterus distends & rises up from the Pelvis it finds more ease in lying on one side of the projecting Spine. Women in the last months of Pregnancy are often troubled with Numbness & Cramps in one particular Leg & Thigh, and this we always find is on that side which is largest in respect to the Abdomen, and is most probably occasioned by the Uterus pressing on the Nerves of that Limb. It has been a question, whether this oblique position of the Uterus might not be sometimes so great as to occasion a difficult Labour by throwing the mouth of the Uterus out of its natural position. The Idea was absurd, for enough of the Uterus will always remain in the Cavity of the Pelvis to preserve the Os Tincæ in its natural Situation. The Parietes of the Abdomen of Women in their first Pregnancy are tighter than if they had had a Child before, the Uterus therefore instead of projecting so much outwards, as it does in future Pregnancies is braced upwards into the Cavity of the Abdomen considerably high, the Stays hurt them exceedingly about the pit of the Stomach, & they are obliged to wear a Waistcoat, and in tall Women the prominence of the Belly will be so little, that we very often do not think they are with Child, while at the same time they are ready to lie in, unless we examine them. A Woman who has had a Child, has her Skin, Muscles & other parts of the Abdomen much looser than before, & in advanced Pregnancy they are often so loose, & the Uterus projects so much from not being braced up, that it hangs over the Pelvis as it were, & we say the Belly is pendulous. In this Case the Uterus does not rise

rise near so high up; this oblique position of the Uterus from it's bending over the Pubis dont seem to occasion any difficulty in Labour, nor does the Obliquity when it falls to one side. The Shape of the Gravid Uterus is Oviform, it's lower end may be compared to the small end of an Egg. It does not take this shape from internal distension, as has been supposed, it grows of itself for if it enlarged by it's being pressed out by the increase of it's contents, it would then be more tense in proportion as it is more distended. A Person's Skin is not stretched by the growth of the other parts of the body, but it grows, & is as loose in an adult state as it was in the state of Childhood, after this manner exactly the Uterus increases, & distends itself and is always loose & unstretched, and might with a great deal of ease hold much more than it does. It dont make a regular bag, but is continually varying it's figure from the neighbouring parts in the different positions of the body, & also from the pressure of it's contents. By the hand moved upon the Abdomen we can generally feel great ineq:-ualities on it's surface from the projection of the Knees, Head, Elbow, &c of the Foetus. Albinus's Figure of the Impregnated Uterus is false, because he has drawn it of an exact Oval figure, the Intestines are all carried up to the upper part of the Abdomen by the Fundus Uteri, & lie principally on the left side, the Liver fills the right side of the Cavity above the Fundus. The Blood Vessells of the Uterus are the Sperm:-atic Vessells going in above, & the Hypogastric Vessells going in below. The two Sets of Arteries anastamose freely, & so do the Veins. In Utero: Gestation they enlarge exceedingly, the Arteries become tortuous, but the Veins do not. The large Veins especially towards the Cervix are called the Sinuses of the Uterus. It is generally believed that these

Vessells

The Gravid Uterus

Vessells are the largest at the back part of the Uterus, but this is not always true; they are always largest at that part to which the Placenta chances to be fixed, whether it be fixed on the inside of the forepart, or of the back part, or of the side, or high up, or low down — When we examine the outer surface of an Uterus impregnated & find in any part large swelling Vessells, we may be certain that the Placenta is fixed immediately on the inside of that part, from this we know exactly how it lies — As the Uterus grows it has been said that it grows thinner, Others have said that it grows thicker. It grows rather thicker upon the whole, and the flesh of it is softer when impregnated than when unimpregnated; but the thickness in One Woman is often much greater than in Another — We cannot trace the muscular fibres distinctly except at the inside, where they appear pretty plainly after the Decidua is scraped off — they are always disposed in Circles round the two Orifices of the Fallopian Tubes as their Center, and the outer Circle of the two directions of fibres meet as Tangents to one another at the middle between the two Orifices — Where the Placenta adheres, the inner Surface of the Uterus is exactly like the outer surface of the Placenta, & the inner surface of the Uterus where the Membranes adhere is exactly the same as the outer Surface of the Membranes —

The Gravid Uterus Lecture 90th

The Uterus where it lies against the Pubis is guided by these bones, above this it swells out, below it is contracted into a point, and is terminated by the Os Tincæ which makes the Orifice leading into the Vagina, and the Os Tincæ always projects a little way into the Vagina. The Fundus Uteri only contains the Child till a very little time before the delivery. When the Os Tincæ is examined just before Labour, it appears more like a ridge than Lips. It is said that the Cervix is dilated gradually into the Fundus, but this seems only to happen very late. The Cervix is blocked up by a firm Jelly, which came out of little Cavities like so many small processes & adheres to the Rugæ. It is much firmer in the first Months than afterwards, at the time of Birth the Os Tincæ dilates, the Orifice enlarges & this Jelly goes away. It is commonly said that the Orifice of the Womb is closed, when a Woman is with Child, but it is not closed, for generally speaking we can get the point of our finger a little way within the Orifice. There are no means which can make a Woman miscarry, that will not stand as good a chance of killing as of bringing about Abortion. Myrrh, Savin &c have no particular power over the Uterus, but only act on it as they affect the Constitution in general. Bleeding frequently in large quantities with strong purges often repeated have sometimes procured Abortion in Patients of delicate Const:itutions by weakening them, as for running any thing up the Orifice of the Uterus, & breaking the membranes so as to let out the Water, which undoubtedly will procure miscarriage, it will as easily go thro' the substance of the Uterus as thro' the firm Jelly which closes it. The Lamella of the Peritoneum which are the broad Ligaments of the Uterus, always disappear in Utero Gestation, for the Uterus as it swells out unfolds the lateral folds of the Peritoneum, which makes these

Ligaments

The Gravid Uterus

Ligaments, and takes them for to cover it, so that what is at another time the broad Ligament is now the Lateral Peritoneal Covering of the Uterus, & the Fallopian Tubes are drawn down close to the Uterus ‒ In the ovarium of a Woman that is pregnant or that has been lately delivered there is a little Yellow fleshy body called the Corpus Luteum, it has in it's middle either a white Cavity, or a little white Glandular looking body which is very Vascular; it's Circumference is not round, but is as it were scalloped, it's Surface is a number of processes ‒ When a Woman has lately conceived, that part of the Ovarium where the Corpus Luteum would be is exceedingly Vascular compared to the other parts of it ‒ The Contents of the Uterus are the Fœtus, the Liquor Amnii or Waters, & the Secundines and the Secundines consist of the Navel String, the Placenta, & the Membranes. The Navel String comes from the Placenta, the Membranes come off the edge of the Placenta, & make with it a compleat bag round the inside of the Uterus without any perforation in it. this bag breaks in the time of Birth at that part which lies over the Orifice of the Uterus ‒ The Child being acted upon by the pains of Labour breaks the Membrane, the Waters come thro' this breach; when the Head follows, & the Navel String is dragged out by the Child ‒ Let the Placenta be fixed to whatever part of the Uterus it will, the rupture of the Membrane will always happen at the orifice of the Uterus, so that by looking upon the rupture in the Membrane that came away with the rest of the Secundines, we can always tell how high up the Placenta was fixed to the Uterus, for example, if the Placenta was fixed to the Fundus Uteri then the sides of the Membrane (measuring from the Placenta to the ruptured part) are of an equal length ‒ The Secundines are of a particular Organization seemingly quite different from a fibrous texture, they are a temporary substance of a Gelatinous appearance made to serve for 9 Months only ‒ The Whole Secundines do not contain a single Globule of Oil. Nurses commonly call a white Placenta a fat one

The Navel

The Gravid Uterus

The Navel String is made up of two Arteries & one Vein more or less twisted round each Other, & is of different Length, from a Foot to a Yard. The Arteries are a continuation of the Trunks of the Inner Iliacs, sometimes only one Artery is found in the String; and of one Fœtus in this Case that Dr Hunter had an opportunity of examining by dissection he found that it came from one inner Iliac only, in others perhaps it is owing to the Anastamosis of the two Arteries at the Navel, some Strings are twisted very much, most of them are twisted irregularly. The End next the Placenta is twisted pretty regularly, the other end next the Child is twisted more irregularly, so that we can commonly tell what part each end belongs to, after the String is cut off from the Placenta & Child. Some again are hardly twisted at all, the short Navel String is sometimes supposed to cause a difficult Labour, by hindering the passage of the Child, it is an exceeding rare Case. The same thing may be said to the opinion of difficulty being occasioned by the String being twisted round the Child's Neck, or any other part of the Child so as to shorten it, it is covered by a smooth Coat externally, a production of the Membranes. The Arteries & Vein instead of being connected together by Cellular Membrane have a white Gelatinous Substance between them. This Jelly feels very ropy tough & slimy, it may be dissolved in Water, & then the String will lose considerably of its bulk, so that when we tie the Navel String, we should tie hard, particularly if it is a thick One for the Arteries being defended by this Jelly will not be sufficiently compressed by slight tying — we should always tie it with a broad Ligature to the Crushing of the Coat, the Jelly gives the string a considerable strength, but its chief use seems to be to prevent the Vessels being compressed, For if the Circulation is stopt thro' the String the Child must die; perhaps

Compression

Compression of the Vessells of the String is the Cause of Death to many still born Children, which we cant otherwise account for. Generally speak:ing, the String dont go to the middle of the Placenta, but rather to one side, & when it gets there the Vessells branch thro' it. The two Arteries run the whole length of the String without sending off a single branch, but just as they enter the Placenta, they always anastamose with each other. In extraordinary Cases the Navel String will sometimes lead on to the membranes, but then the Vessells all run to the Placenta, when we cut the Navel String, we commonly leave an Inch or an Inch & half with the body of the Child. The Shape of the Placenta is very various, it is thick:est at the middle, its outer surface is convex, answering the Concavity of the Uterus, its inner surface is gently concave, the inner Surface is smoothed by the membranes continued over it, the outer Surface is uneven marked by Furrows, which divide into portions like the Lobuli of the Brain, these furrows are not deep unless made so by force, used in bringing away the Placenta from the Uterus. There is always a sepa:rate Navel String to every Foetus whether there be two or more, some:times the Placenta of each is united to the other edgewise, at other times they are found to be situated at some distance. It every now & then happ:ens that a Placenta has a little Lobe fixed to it, the greatest part of the substance of the Placenta, is made up of branches of the Arteries & the Vein of the Navel String; this we call the fœtal part of the Placenta, in opposition to the maternal part of it which is made by the Vessells from the Mother. It is a common Opinion that the Foetus throws its Blood to the Mother by the Arteries, & recieves Blood back from the Mother by the Vein, but all the Vessells of the Navel String terminate in the Placenta, & if we clear the Secundines from Blood immediately after

they come

they come away, by putting them in Water & milking the String, we can inject the Placenta very minutely from the String, & none of the Injection will escape, which would not be the Case, if the Vessels of the Child were continuations of the Vessels of the Mother, & the branches of the Arteries & Vein anastamose very numerously in the Placenta, so that by injecting the Artery from the String, the Injection very readily returns by the Vein, and by injecting the Vein it very readily returns by the Arteries, no part of the body appears more Vascular than the Placenta. The Membranes are three, first the Amnios or Amnion beginning from the Child & proceeding outwards to the Uterus; Second the Chorion; Third the Decidua, before called the false or Spongy Chorion. The Inner membrane or Amnios in a human Subject is uniformly clear, & without any appearance of Vessels or Organization, it is like a Film of Jelly: its outer surface is covered with a Jelly, by which it adheres uniformly to the Chorion on the outside of it; but so loosely that it is easily seperated from that membrane, this membrane adheres to the Navel String, but so firmly that it can't be seperated, so that it makes a compleat Bag, & the Waters can touch nothing but the Cuticle of the Child & the Amnios; viz the Cuticle & Amnios seem like a continuation of each other, tho' thin it is very firm & will resist being broken more than the Others & it is perfectly trans:parent every where. The Chorion has been divided into two Lamellæ, an inner & an outer, the inner called the clear, the outer the Opaque Chorion, but we rather choose to call the inner Lamella the Chorion, & the outer Lamella the Decidua, the former is pretty firm, the latter is very tender, the Chorion covers all the outer surface of the

amnios

amnios, lines the inner surface of the Decidua as far as the edge of the Placenta, & then is continued over the inner surface of the Placenta, & therefore to the Navel String, it is inseparably united every where with the Placenta. In general it is very thin, but as it approaches the Placenta, it grows thicker, & upon that it is pretty thick. The Decidua called by Others the false or Spongy Chorion is Opaque, & very much of the Consistence of a Curd, it peels off from the Uterus, so as to have a rough surface; it is connected to the Chorion by little threads, the remains of Vessells, which are seen to be torn thro in seperating the one membrane from the Other. It parts from the Chorion at the edge of the Placenta, & is extended over the external surface of the Placenta, so as to give it a surface not filled with Vessells, as its Substance is. It has no Vessells from the Navel String, but it has Vessells from the Womb, & is properly an inner Lamella from the Womb, these Vessells are plainly to be seen upon the membrane, immediately after the coming away of the Secundines, especially if the Woman was deliv:ered before her time. The Uterus furnishes a fresh Decidua every time it is impregnated which peels off at Birth & makes part of the Secundines, & at the next pregnancy another is furnished, the shedding & reproduc:tion of this membrane is the reason of our calling it Decidua. It is an efflorescence from the Uterus to this membrane, if we spread it on a piece of paper immediately after it comes away from the Uterus, & hold it before the fire to dry it with the Blood in the Vessells. The late Professor Monro would not allow that it received Vessells from the Uterus, but it certainly does ——

The Gravid Uterus

Lecture 31st

Many Quadrupeds have only one Placenta, & mass of a round figure as in the Rabbit, Others have a Placenta like a Belt, which surrounds the Fœtus, & its membranes, as the Dog & Cat; others have perhaps 70 or 80 Placentas or Placentulas, as in Cows; the Placenta in a Cow is plainly of two kinds; there is a Fungus grows up from the Uterus with a number of Cavities in it; there is another mass which is the Fœtal part of the Placenta, & the Vessells of this part are inserted into the Cavities. The Vessells of the one part are intermixed with the Vessells of the Other, but not united, for one set may be exceedingly minutely injected, without any of the Injection entering the other set. The Processes of the Fœtal part are, the Vessells come out of these cavities at Birth, the Fœtal Placenta seperates from the Uterine Placenta, & comes away; the Uterine Placenta or Fungus is left behind sticking to the Uterus, & gradually shrinks away, which Fungus is renewed when the Cow is with Calf again, so it is generally in all the Ruminants, in the Animals it is plain that the Placenta is double, made up of two parts, Uterine & Fœtal, from this circumstance Dr Hunter concluded that it is so in the Human Placenta. The Placenta is very spongy, it may be blown up by means of a Pipe thrust into it, & the air will escape by a thousand Orifices, each of these Orifices is the mouth of a Vein, coming from the Uterus, it has also a number of convoluted Arteries running on its surface; the fact is a great number of Arteries & Veins enter the Placenta from the Uterus, & soon terminate in its spongy substance and the Veins take up the Blood & return it again to the Mother. Some have thought that there is an Alantois in the Human Subject as well as in Quadrupeds; in the Cow this is particularly evident, it is

a Bag

The Gravid Uterus

a Bag in the Uterus for containing the Urine of the Fætus or Calf & from it there goes a Pipe along the Navel String, which enters at the Navel & goes to the Bladder of the Calf, the Bag is called the Atlantois, & the Pipe is called the Urachus, but there is neither Atlantois nor Urachus in the Human Subject – The Contents of the Secundines are the Liquor Amnii & the Fætus, the quantity of the Liquor Amnii is very different in differ:ent Women, sometimes there is not more than three pints, at other times there are many Quarts – In Labour it sometimes happens that the membranes are protruded out at the Vulva unbroken, if in this Case we scratch the membranes & let the Liquor out, we generally find it clear which is a Proof that it is not always foul towards the end of Utero: gest:ation, as some have supposed, sometimes indeed it is foul, which perhaps is owing to a little of the meconium being pressed from the Rectum of the Fætus, & tinging it blackish or greenish, for the meconium is of a black or Green colour, & if the Child is dead, especially, it is very apt to escape from the Rectum, the Liquor is like Water not ropy, it is very Saline, & the Salt it contains is the true Sea Salt – The principal Use of this Liquor seems to be, to keep the Uterus out from the Fætus & prevent its being destroyed, for a blow upon the Uterus will on this account, have no Effect upon the Fætus, no more than a Cork will be affected by a blow given to a Leathern Bottle, which contains a Cork, & is filled with Water; it seems likewise to have some effect in keeping the membranes, & the Placenta, adhering to the Uterus, by pressing them against it; some have supposed that it serves for the nourishment of the Fætus, & that it has the properties of the Serum of the Blood, or the white of an Egg, but it does not serve that purpose, neither has it those properties, for it remains as fluid as ever after it has been exposed to a boiling heat, nor had Coagulants mixt with it in at the time of

Labour

Labour, the Placenta is united with the Uterus, & when the Child is born, the Navel String is to be cut, when it is cut, if a Ligature is not made upon it next the Child, the Child will bleed to Death, or lose a great quantity of Blood, but there is no occasion for making a Ligature on the side next the Mother, there is no danger of the Womans bleeding to Death, for no Blood passes from the Uterus to the Navel String, the small quantity of Blood which comes out, is only what the Placenta contained, & is pressed out of it by the contraction of the Uterus — We commonly make a Ligature next the Mother for the sake of Cleanliness, tho' it is better not to do it, for by leaving the Vessels open for discharging the Blood from the Placenta, as that is pressed on by the contracting Uterus it's bulk will be diminished & it will afterwards pass more easily thro' the Vagina, & we may prevent the Blood from the String dawbing the Bed Cloaths by wrapping the end of it in a Cloth — The reason why a Quadruped dont bleed at birth is that the Arteries of the Navel String are torn thro', & therefore dont bleed, as the Arteries of the Miller's Arm did not bleed when they were torn thro' by the Mill; and an Artery which is bruised will not bleed, for which reason Mr Arnaud recommends bruising the Spermatic Artery instead of tying it in Castration — Dr Hunter once attended a bitch that pupp'd, & saw that she licked up the Waters immediately after they came from it, & when a Puppy was born, she tore thro' the Navel String at some distance from the Navel, & swallowed the Secundines with great eagerness, but there was no bleeding from the Puppy, he cut off the Navel String from one Puppy, & the Blood spurted from it, but the Bitch turned round & immediately as she saw this, she bruised the end with her Teeth, & the Blood directly stopped — To know whether tearing the Navel String of a Child thro' would have the same Effect, Dr Hunter & Dr Mackauly did as follows, as soon as a Child was born, & the Placenta still adhering to the Uterus, they tore the String thro', at some

distance

distance from the navel, & no Blood came, then after being perfectly satisfied they made the Ligature at the usual place, & cut off the long piece of navel String — the Instant that the Placenta seperates from the Uterus, the Vessels of the Uterus will bleed generally after birth, this seperat:ion happens gradually, the Uterus contracts & the Bleeding is not so consid:erable, there never can be any considerable seperation of the Placenta without an Hæmorrhage, hence Uterine hæmorrhages during the time of Gestat:ion, are to be feared — Sometimes the Placenta happens to adhere immediately over the Os Tincæ, as that opens, of course part is sepe:rated, while the Fœtus within prevents the Uterus from contracting and stopping these Vessells — Such Labours are always dangero:us and attended with great Floodings — — The size of the Fœtus at nine months is different in different births, commonly its weight is exaggerated; By weighing a great number of Children born at the full time in Brownlow Street Hospital, Dr Hunter & Dr Maccauley found that they weighed generally from six to eight Pounds, the largest weighed 11. pounds, 2 ounces, the smallest about four pounds weight — The Fœtus in the Uterus, is brought into as small a compass as possible, the Arms and Legs are more or less bent in a variety of Ways — so as to fill up the cavity between the Head, & the Breech; the general and most natural position is with the Head downwards, the back to one side (commonly the right side) the Ears & Sides of the body are backwards and forwards, or perhaps the Back and Belly are rather obliquely situated, than directly from side to side — The common Opinion was that the Head of the Child, in the first 7 or 8 months of Pregnancy was upwards, and that in the latter months, it shifts its position by turning downwards, to

prepare

prepare for birth, this may perhaps be the case sometimes, but the most natural position is with the Head always downwards, - If we examine a woman standing about the 6th month, we can feel that this is a fact, for with the Finger we can raise the head up along with the rest of the body in the Waters, and it will again sink down as it was before, the reason why the Head naturally is downwards is this, the lower part of the Uterus is the most depending, even when the woman lies on her Back, and the Child being specifically heavier than the Liquor Amnii, it will sink in it with its Head downwards too, because that is the heaviest part of the Child - In the first months when the Fœtus is very small, & the quantity of Liquor great, then it floats about in every direction, but as it increases in bulk, the Water diminishes till at length it becomes too large to move about, and is locked by the Uterus in the position already described, 'tis exceeding rare that a Child can turn in Utero, in the last months - This seems to be the reason, why a Child is sometimes born with the Foot bent up against the fore part of the Leg, or clubbed as it is called, from its having been long locked in that position - In such Cases the Limbs were originally well formed, and therefore we can often restore them by degrees to their natural State, by binding them in their proper position, sometimes the Head is not downwards, this may happen from the Child starting, and kicking, when it had but just room to move so as to alter its position from the most natural, & then to be locked in that position - If we throw a Fœtus of 7 or 8 months into a pail of Water in any position, the Head will always

get to

get to the bottom, first because the lower Extremities having a larger surface in proportion to their bulk than the Head are specifically lighter — If the Fœtus lies in the most compact form, and it's Head downwards, how does the Whole correspond with the Cavity of the Uterus, &c. Now the Fœtus measures more from before to behind, than it does from side to side, and the Uterus measures most from side to side, it lies with it's Back to one side of the Uterus, and it's Belly and Knees to the Other, and as it cant easily lie on the Spine, it lies rather more to one side of the Uterus, than to the other, this is it's most natural position, but as the Child passes thro' the external Organs in Birth, it turns to adapt itself to the Vulva, & comes into the World with the Occiput against the Pubis, and the Face downwards towards the Rectum, which is the constant posit:ion of the Head, at the most natural Birth ——

The Fœtus

Lecture 92d.

The Cuticle of the Child is projected on the Navel String, & where it ends the Gelatinous Substance begins; at this part the Navel String always drops, — The Thymus of the Fœtus is large & divided into two Lobes, it hangs down in the cavity of the Chest before the large Vessells, & Pericardium; after the Birth it degenerates into a tough Ligamentous Substance, in a Calf it is called the Throat sweetbread, it's use is not at all known — The Lungs that have never received Air into them are a firm, red, heavy Mass, like a piece of flesh in any other part of the body, & will sink as readily in Water; We are often called upon to give our Opinion in a Case when a Woman is suspected of having murdered her Child that is newly born, we cut off a piece of the Lungs & throw it into Water, if it swims, we generally conclude that the Child was born alive & has breathed, if it sinks we conclude that it was born dead, & therefore never has breathed, we must not take upon us to say that a Child has breathed, because that we find the Lungs will swim, for if the Child has been dead any length of time especially in hot Weather, Putrefaction may have come on, & let loose the fixt Air into the Cellular Substance of the Lungs, & thereby cause them to swim in the same manner as we see a dead Dog that has lain in Water some days, swims on it's surface, & if the Child has lain dead sometime in one position, the depending part of the Lungs will be filled with the watery Juices, & the Air being specifically lighter, will be pressed upward by them, so that below the Lungs will contain Water, & above they will contain Air, if a bit of the depend:ing part is cut off, & thrown into Water it will sink tho' the

Child

Child has breathed, & the Substance of the Lungs at one part may be condensed from Inflammation so as to sink in Water, so that it is not in our power to say certainly that a Child was born alive from examin: :ing the Lungs, & finding that they will swim, or that the Child was born dead, because a part of them at least will not swim. We should be very cautious therefore in what we say, & were it only in pity to the Unhappy Woman should always favour her, besides it is a very common thing when a Child is born dead, for Somebody to blow down the Throat by the Mouth to endeavour to Revive it, & the Air by this means getting into the Lungs will distend them & have the same Effect upon them as if they had breathed. The upper parts of the Child are much larger in proportion than the lower Extremities, which are not only small in proportion to the Head, but also to the Trunk, & upper Extremities. The Pelvis is small at birth, hardly any part of the Bladder is so low as the Os Pubis, but rises considerably above it, & makes the Angle of reflection of the Peritonæum a great way higher than the bone; the Uterus is principally above the Pelvis, & there is no part of the Intestines within the Pelvis, but as we grow up the Pelvis grows larger, & then the Abdominal Contents, and those of the Pelvis fall lower down. The Blood dont circulate thro' the Lungs as it does in an Adult, but it passes from the Pulmonary Artery into the Aorta by the Canalis Arteriosus, which is a Canal of communication between the Pulmonary Artery, & the beginning of the Aorta Descendens. When the Blood circulates thro' the Lungs after Birth, this Canal becomes useless & dries up. From the Bladder to the Navel there goes a Ligament which is supposed to be

the Ligamentum

the Ligamentous remains of the Urachus, become impervious, as in the Calf, & other Quadrupeds, but there is never any the least appearance of an Urachus in the Human ~~Subject~~ Fœtus, neither in it's early nor it's advanced state. The Aorta divides into two, the internal & the External Iliac; the External which is the smaller in a Fœtus goes thro' the Groin on to the Thigh as in the Adult. The Internal gives off a few small branches in the Pelvis, but the principal Trunk goes out at the navel, & constitutes the Umbilical Artery. These Iliac Arteries after Birth become impervious from the navel as far as where they give off the branches to the Pelvis, & degenerate into Ligaments. The Canalis Arteriosus, & the Elongation of the Internal Iliac Arteries into the Umbilical, make the peculiarity in the Arterial System of the Fœtus. The Venal System has a peculiarity there is a Vein going from the Liver out at the navel, which forms the Umbilical Vein of the navel String; from the navel the Umbilical Vein goes up to the Fissure in the Liver along the edge of the Falciform Ligament, where it unites & makes one Trunk with the left branch of the Vena Portarum, so that the returning blood from the Intestines of the Fœtus mixes with the returning blood from the Placenta; part of this mixed blood circulates thro' the Liver by the branch of the Vena Portarum, & part is carried into the Vena Cava Hepatica Sinistra by the Ductus Venosus, that runs between the Lobulus Spigelii, & left Lobe of the Liver. This Canal of communication the Ductus Venosus comes from the united Trunk of the Umbilical Vein, & left branch of the Vena Portarum, & opens into the Vena Cava Hepatica Sinistra just at the Trunk of the Vena Cava; Besides

these

these peculiarities in the Arterial & Venal Systems, there is another in the Heart itself, the Foramen Ovale, which is a passage from the right into the left Auricle. It has a Valve upon it on the left side of the Septum Auriculatum immediately below the projection called Lower's Tubercle, it closes up commonly after Birth, but in some Adults it is found open; thro' this passage the Blood passes from the right auricle into the left, & is prevented from returning by the Valve in the left Auricle. the great difference in the Vascular System of a Fœtus from that of an Adult is, that it has a Circulation with a Placenta, for the Placenta must be considered as a part of the body of the Fœtus. To begin at the navel we trace the Umbilical Vein to the Liver & so on to the Heart; The reason why it don't go directly to the Ductus Venosus without uniting to the branch of the Vena Portarum, & why it mixes the Blood first with that brought from the Intestines, we don't know. In an Adult there seems to be a necessity for that Blood, which is to nourish the body, to under:go a previous change by circulating thro' the Lungs, in the Fœtus it would be useless, for it can have no advantage from it. The Branches of the Aorta distribute the blood to all parts of the body, & a considerable quantity is also carried to the Placenta by the internal Iliac Arteries: the Veins return the Blood to the Heart mixed with a considerable quantity of fresh Blood from the Placenta by the Umbilical Vein, & by the Ductus Venosus to the Vena Cava Inferior. We suppose that at least a third part of the whole quantity of Blood brought to the right Auricle by the Vena Cava passes immediately thro' the Foramen Ovale into the left Auricle & Ventricle, & so into the Aorta again: the rest of the Blood will pass from

the right

The Fœtus

the right Ventricle into the Pulmonary Artery, & of this quantity prob=
:ably one half passes thro' the Canalis Arteriosus into the Aorta Descen=
:dens, so that not more than a third part of the whole quantity of the
body circulates thro' the Lungs to prepare the Way & keep the passages
open. The Blood which passes thro' the Lungs is returned to the
left Auricle by the Pulmonary Veins as in the Adult. The Size &
Figure of the Fœtus at different times of Utero gestation have been
greatly disputed about by different Writers. They certainly vary much
in different Fœtuses. A Fœtus of the size of an Horse bean has
very little more than Head & Trunk; the head has two black spots
which mark out the Eyes, the Trunk has four little nipples, which
afterwards grow into Extremities, & the navel String is thick & short.
Women generally miscarry in the 11th or 12th week after Conception,
reckoning from the last Menstruation. This is the time of more
than 19 out of 20 miscarriages, & the Child is nearly always of the
Horse bean size: but then we sometimes find that Women misc=
:arry at 6 or 7 Weeks, & the Child is then of the Horse bean size;
and sometimes they miscarry at 11 or 12 Weeks, & the Child
is two or three Inches long. The fact is this, when the Conception
is of the size of a Hen's Egg, the Fœtus is of the size of a Horse=
:bean. It comes to this size about the 6th or 7th Week, at this
time it frequently dies, as Fruit is blighted in the Blossom;
the Woman having no bad Symptoms immediately arising goes
on to the 11th or 12th week with the dead Fœtus in her Womb, & then the
Symptoms of Labour come on & she miscarries. The Fœtus therefore
comes away of the Horse bean size, & is in reality no more than 6 or 7
weeks old. There are instances of a Child of the Horse bean size coming
away

The Fœtus

away so late as at nine Months, tho' it had died at the end of the 6th or 7th Week, & yet the Symptoms of Labour did not come on till the end of the 9th Month — If a Woman goes longer than the 11th or 12th week, she seldom miscarries, the fruit of her Womb seems then to have become so strong as to be able to resist the blasting cause, — at the end of the 11th or 12th Week, the Child is two or three Inches long: if it dies at this time the Labour comes on, then the Woman will miscarry at the end of the 12th Week, of a Child of this size, & this accounts for the other Variety at the usual time of miscarriage, (i.e.) about the 11th or 12th Week; but generally speaking, all miscarriages happen about the end of the 11th or 12th Week, & the Child is of the size of a Horse bean, or as others call it, of the large Bean size — When the Child is of the Bean size, the Bowels are all covered in, & are not seen, but Dr Hunter once saw a Fœtus of the size of a large Fly very distinctly every way without a magnifying Glass, which the Mother was sure was just four Weeks old, it had no Navel String, its belly lay close in contact with the Secundines, & Vessels came out of its belly to form the Navel String, the Bowels were only covered by a transparent Membrane, thro' which they appeared, the Spinal Marrow was a distinct white Chord very plainly appearing thro' the Vertebra —

Secundines, Lect 3d [illegible]

The Secundines &c

Lecture 93

So much for the Foetus, & now return to the Secundines. In the first months of Pregnancy there is a wonderfull distance between the Amnion & the Chorion, the Jelly between them is in great quan:tity & keeps them divided. The Ovum properly speaking is the Cho:rion & all it's contents, the Decidua is plainly the inner surface of the Uterus, & always seperates from the Uterus, & comes away along with the other Membranes. In the Miscarriage of 11 or 12 Weeks it is so much torn, that it is hardly ever distinctly seen; it covers the Ovum & is reflected over it again, so that on one part the Foetus is covered with four Membranes, the Amnion, the Chorion, the inner Lamella of the Decidua adhering to the outside of the Chorion, & the outer Lame:lla of the Decidua adhering to the inside of the Uterus all round. The first appearance in the Uterus after a Woman has concieved is a slimy Mucus or Membrane covering the Fundus Uteri without any sensible adhesion, & at the same time the Fundus Uteri rising out into an Efflorescence. These two parts unite from the Decidua, & between them lies the Vesicula, (i.e.) the Chorion with it's Contents. Dr Hunter once found the Decidua formed in the Uterus of a Woman tho' the Conception had not passed out of the Fallopian Tube. The Woman died from an internal flooding into the abdomen in consequence of the distended Ovum or Conception having burst thro' the Fallopian Tube into the Abdomen. When the Concep:tion or Ovum passes out of the Fallopian Tube, it is lodged between the two Lamellae, of the Decidua, & fixes itself somewhere to the Uterus, by means of the outer part, as it increases it projects farther & farther

The Secundines &c

farther into the Cavity of the Uterus, till it fills up the Cavity, & it takes the thinner part along with it, for the Decidua Reflexa, wh:
:ich is continued over it as far as the edge of the Placenta at which part it is reflected from that which adheres to the whole inner surf:
:ace of the Uterus, so that that, which adheres to the Chorion & encloses the Conception by adhering to it, is the inner Lamella, or reflection of part of the Decidua, & that which adheres to all the inner surface of the Uterus, is the outer Lamella; as the Conception increases & brings the inner Lamella, more closely into Contact with the outer, they unite & become one membrane; the outer Lamella of the Decidua, as it is originally forming, must consequently have three perforat:
:ions in it, one for the mouth of the Uterus, & two for the Orifices of the Fallopian Tubes, because it is the inner surface of the Uterus itself, & these perforations are observable in the Decidua of an early Abortion, while the two Lamellæ have yet a Cavity between them from their not being united. If the outside of the mass, which a Woman brings away from her Uterus, is covered with a shaggy membrane, we may be sure, that it is the Conception covered by the Decidua or spongy Chorion, & that she has miscarried of a very early conception. The Fœtus has a little bag at its navel, that contains a Fluid, which we shall call Vesicula Umbilicalis as from this bag an Artery & Vein go into the Bowels of the Fœtus, in a little time the Bag becomes a white Speck, & the Artery & Vein become a white thread, but they soon after disappear. These have been supposed by some that have observed the fact to be the

Urachus

The Secundines &c

Urachus & Alandois, which they most certainly are not — The Chick in the Egg has a bag like this, which is carried into the Bowells of the Chick gradually till it is entirely taken in, the Bag is very Vascular and from it there goes a very considerable artery into the Bowels ——— ——— ———

Menstruation

The menses generally appear at the age of Puberty, which is in the Country commonly at 15 or 16 years of Age, sometimes sooner, some: :times later. The quantity is not to be ascertained as it varies greatly even in the same Woman at different times, some Women dont lose more than ℥v each time, while others will ℥xvj or perhaps ℥xxx & yet enjoy very good health. Generally speaking a Woman loses about ℥v. or ℥vj at each menstruation. It was a general Opinion among the Antients that this Blood possessed a poisonous quality, & that when it was retained it poisoned the Constitution & that the Woman ~~dont~~ could not possibly recover her health without this Evacuation was restored. But now it is universally believed, that this blood is com: :mon healthfull blood, & that the Effects ascribed to it by the Antients were merely Chimerical. The Retention of it is the Effect & not the Cause of ill health, for if a Woman recovers her health, she almost certainly has her menses return. The Source of this Evacuation every one knew was from the Uterus, but as they found that some Wom: :en had something of the kind in Pregnancy when the mouth of the Uterus is closed, they were staggered & believed that it came partly from the Vagina. This Redundancy of blood may flow from any part of the

of the body, but in general it comes from the Arteries on the Fundus Uteri. The immediate cause of this Evacuation is most probably a fullness, tho' it cannot be determined by weighing the body. The way of accounting for it Mechanically is very idle. It is said that the Uterus being the depending part, & the Veins not having Valves there, they will give way to the pressure of the Blood, but a Woman would as certainly Menstruate were she hung up by the heels, if She continued in good health. The Animal Functions cannot be explained upon Mechanical principles. A Woman having Organs capable of making more Nourishment than is necessary for the support, & more being required to nourish the Foetus in Utero seems to be the Final Cause of this Evacuation. No other Animal has the Menses except a Species of Monkey. The general Period is four Weeks, sometimes it happens a day or two sooner or later, & some Women know even the very hour it will come on. The time of the Menses leaving a Woman is from 45 to 50 Years of Age. The greatest Number of Women at 50 have no Menses, but in this as in other things there is great Variety. A Woman naturally & we may say always is Obstructed when She is with Child. The Stories of Women having the full Menses all the time of Pregnancy are not true, there are shows now & then, & even a Flooding, but they are never like regular Menses.

Impregnation & Conception

Aristotle the first writer on Midwifery lived in the Center of the Greek Empire, & was a very respectable Midwife for the Age he lived in.

His Theory

Impregnation & Conception

His Theory of Generation was as follows – He say that the Male & Female Testicle both secrete seed, that the Male Semen is thrown into the Uterus at the time of Coition, & that the Female Semen passes into it at the same time from the Ovaria & mixes with the Male Semen & they two make the Child – & that the Male Semen makes the Animal by a power inherent in itself, & that the Female Semen nourishes it All Writers from Aristotle to Harvey & his Predecessors agree – Fabricius ab Aquapendente only commented upon Aristotle, & Harvey seems to have gained his Lights from Fabricius, but tho' he had great Opp:-:ortunities of examining Does at different periods after receiving the Buck, he made out very little of Generation – he says that the first appearance of Conception in a Doe is, that a great quantity of blood is derived to the Womb, and the inside of the Womb is covered with a Slime, which afterwards makes the Chorion; he says that the Uterus has a power given it by the Creator to make the Child, perhaps as the Brain has a power of Thought, that it is not an inward power natural to the Uterus & called to Action by Coition, but it is a power given to the Uterus at that particular time by the immed:-:iate hand of God Almighty – Steno & De Graaf then published the Doctrine of Man's being an Oviparous Animal, & that he is formed in an Ovum contained in the Ovarium – Mr John Hunter thinks that if any ovum comes from the Ovarium, it is very small, and imperceptible, and he thinks that the Male Semen is injected into the Uterus in Coitu, & that a Fluid is thrown from the Ovarium at the same time into the Uterus to mix with it, for he kill'd a Bitch

instantaneously

instantaneously in Coition by running an Awl between the Vertebra of the Neck, & the Dog keeping on his Process, he opened the Bitch, and saw the point of the Penis within the Orifice of the Uterus, & the Semen come from it, and the Ovarium had discharged a Fluid into the Uterus; He likewise is of opinion that the Corpus Luteum is Glandular. Leuwenhoek believed that an Animalcule was thrown into the Mother by the Father, which grew up to a Fœtus as a Tadpole grows up to a Frog

Monsters

The Subject of Generation at present is not understood, and if we cannot account for the formation of a perfect Animal, we certainly cannot for Monsters. A very common Monster is a Child without a Brain, instead of it it has a bag of water; another common One is a Child born with its bowels hanging out of its Abdomen; so is the Child with a Hare Lip, the double Child & the Child with some superinnumerary parts, as Six Fingers &c. It was the common Opinion that Monsters were the Effect of the Mother's Imagination owing to her being frightened in her Pregnancy, as Marks were supposed to be caused by their longing for some particular things. But Dr believes with Winslow, that all Monsters are originally so formed, that they are never wellformed Creatures at first, they were then hurt, & grow up Monsters in consequence of that hurt, for the interiors are all calculated to the deformity. Dr Hunter dissected a Calf with two heads & found that the Aorta sent off branches properly to both heads.

Flooding – It sometimes

Flooding —

It sometimes happens that the Placenta fixes itself so low down, that it lies across the Mouth of the Uterus, so that when the Os Tincæ dilates for Birth the Placenta separates, & its Vessells pour out a large gush of Blood — If the Finger is introduced the Membranes are not to be felt, for it meets with nothing but Placenta — In this case the Membranes not being broken, the Woman will flood exce: :dingly, and if she is not delivered quickly, will die of flooding — All we can do is to endeavour to deliver her as soon as possible, and run the hand thro the Placenta, & break the Membranes to let out the Water — If she is delivered very soon there is a chance of her doing well; but commonly she is so much overpowered by the discharge that she sinks under it —

Retroversion of the Uterus

Sometimes the Fundus of the Uterus turns down behind & lies between the Cervix Uteri & Rectum, if pregnant as it increases it becomes fast locked, & pressing the Neck of the Bladder against the Os Pubis it occasions Suppression of Urine; from this Compl: :aint, a young woman died, for there was no possibility of getting the Fundus up again —

The Fœtus in Utero

Lecture 94th

There are two questions agitated with respect to the Fœtus, First whether there is a Circulation of Blood between the Mother & Fœtus, Secondly, how is the Fœtus nourished? whether by the Navel String, or by the Mouth, or both? In the first place the Vessells of the Fœtus are not continuations of the Vessells of the Mother, there is no passage of red blood from the one to the other, for injections will not pass from one to the other — It is nothing surprizing, that the Fœtus should make red blood of itself independant of the Mother, for the Chick in the incubated Egg has this power evidently without the Mother — It is most probable that the Juices which nourish the Child are carried from the Uterus by absorbing Vessells to the Fœtus — In the second place it has been said that the Fœtus in its early state is nourished by the Navel String, & that afterwards when it comes to have a Mouth sufficiently formed, it is nourished by the Mouth, that is by swallowing the Liquor Amnii — It is most probable that it is nourished by thousands of Lymphatic Vessells, which absorb Nourishment from the blood of the Mother, and carry it along the Navel String — It is true we can't see any Lymphatics running upon the Navel String, yet it is reasonable to conclude they do — An Early Fœtus cannot be nourished by the Mouth, its nourishment must be conveyed along the Navel String — If then it is sufficiently nourished by the Navel, why need it be changed for the Mouth? Besides the Liquor Amnii is not of a nutritious quality, it no way resembles the white of an Egg, for it is not coagulable by heat — and Dr Hunter has seen a Fœtus whose Intestine a little below the Duodenum was impervious

and divided

and divided thro', & the other end began at some distance from this. — Dr Cooper brought into the World a full grown Child without any Head, Heart, Lungs, or Intestines: and a Kitten was sent to the Royal Society that was born without either Nose or Mouth, so that it is plain that the Fœtus is nourished by means of the Navel String, & not by the Mouth.

Diseases of Women

An Imperforated Hymen is unnatural & monstrous; it is sometimes not discovered till the time of the Young Woman's being out of Order. The Blood of the first, second, or third Periods of Menstruation is retained within the Vagina & the Uterus, & makes a bag of fluid to be felt pressing down towards the Vulva; this must be let out by a small Crucial opening made where the part is thinnest, & the opening must be kept open & dilated by a Sponge Tent. Dr Hunter saw a Woman that had the sides of her Vagina grown together occasioned by Sores therein from a Poxey Cause, the Surgeon with a Trocar let out near a large wash-hand Bason of Blood the thickness of Cream, the Orifice afterwards closed & at the months end the accumulated Blood was again let out, inflammation from the distension came on & she died; if the opening had been enlarged the first time, it is probable it would have remained so, & the Woman have been saved. When the Vagina is too narrow, it must be dilated gradually by Sponge Tents beginning with small ones & increasing their size by degrees. Too short a Vagina is irremediable. The Menses are under the immediate influence of the Nerves, hence when a Woman is much affected in her Nerves, the Menses are likewise considerably affected. When a woman is ill, & the Menses

dont

dont make their appearance, we are not apt to expect any good Effect from the exhibition of Emmenagogues, or Forcers as they are called, nor is there any Medicine that has a Specific Tendency either to check or promote them — We are to regard the ill health without having any regard to the Menses, for there is no Medicine that has any Effect determined to them in particular — we must always manage the general complaints without considering the particular one of the Menses, & the Moment that good health is established, the Menses will appear, or cease to be profuse if they were so before — If the Woman has no Menses, or has too Much, if her health is otherwise good, we should do nothing — It is the principal thing to study general health — When the Menses are going off too, if they are irregular, we should do nothing, for it would be absurd to endeavour to keep them up farther, than the time which Nature has set — The greatest part of the Diseases of Women, as the Cancer of the Womb for instance, are apt to appear just after the Natural time of the Cessation of the Menses, so that they suppose the disease to arise from their ceasing too soon, here too we should do nothing with respect to the Menses, but treat the other Complaints alone, The Cancer of the Womb however, we can do nothing at all for — Some Women have exceeding painfull Menstruation, & fever with it, they will be Much better if they keep themselves quiet & very warm, particularly their feet, & when the Menses are Much Affected a Dose of Mithridate should be taken at Night: a quarter of a pint of common Tansey Tea hot in a Morning, & half a pint of an Evening is of considerable service, & is a warm stomachic Bitter, & a little Uterine, if there is any such Medicine — Hysteria is, as Englished from the Greek, the Womb disorder: the most common Symptom of it is a rising in the Throat

Throat, — the Greeks thought that the Womb was a distinct Ani:
:mal endowed with Locomotion, & would rise up in the Hysteric
Fit so as to press upon the Trachea, & almost choak the Patient,
they thought this Animal disliked Stinks, and therefore they
attempted to drive it down to its proper place by applying Stinks
to the Nose, such as Burnt Feathers &c, and to invite it down they
fumigated underneath the Petticoats with sweet smelling things
the Bearing down of the Uterus they treated in a similar Way, they
applied Stinks below & sweets above —

The Fluor Albus is not commonly to be considered as a Disease,
for it seems to be natural in some degree to most Women — Women
think that it is a heavy disease upon them, & that it drains away
their strength, but they take the Effect for the Cause, their ill state of
health is the cause of, & not owing to the Fluor Albus — Such Women are
generally nervous, that is of an Anxious Mind, hurried with trifles; the
alteration of the Weather has a great Effect upon them, & when they are
vexed, the Drain is increased — we must attend to their general health
and when relaxed direct them to use the Cold Bath, Exercise, Dry Diet,
Bark, & such like — we should particularly insist upon cleanliness,
for all internal Surfaces have their fluid increased from the Stimulus
of what is secreted, stagnating on them, they should wash themselves
thereabout with Something astringent, as Red Port or Tincture of Roses,
but as these stain the Linnen, it may be more agreeable to them to use
an Infusion of Green Tea Cold, which is sufficiently astringent, the
Vagina should be washed with it by a Sponge fastened to the end of a
Stick, rather than using a Syringe; or a little Allum may do & by this

means —

means the discharge will be greatly diminished. Finding that the Cancer of the Uterus is preceeded by the Fluor Albus, we should be rather backward in using Astringent Medicines to restrain the discharge, for if it is a natural discharge from the Constitution, they will be detrimental by locking up the Humours ——

There is a very common disease, the nature of which we are ignorant of, commonly attended with Fluor Albus, tho' sometimes without; it is an intolerable sharp itching about that part of the Vagina where the Urethra is, sometimes about the external parts of Generation, most commonly without pain, but the Itching is most dreadfull to be born. When it is external, we direct Sulphur, Mercury, & washing the parts well. Goullard's Lotion sometimes does good, & cooling things also are used, & often too without any good Effect at all. In two or three Cases, introducing a Bougie two or three times a day into the Urethra, & by that Means keeping it upon the stretch for some little time has taken off the irritation & cured the Complaint; in all Cases of this kind do well of themselves in time, they have never been known to bring on a Cancer or any other great disease. The Vagina & Uterus being united to the Bladder, there cannot be a Procidentia Uteri & Inversion of the Vagina without the Bladder being drawn down too, & indeed it comes really out of the body, & makes a part of the Tumor out of the Labia. To introduce a Catheter, we must turn it just the contrary way from what we do in common. There are Tubercles often found in the Uterus, which are sometimes so numerous, & large, as to distend the Uterus considerably. We suppose them to be little Glands in the fleshy substance of the Uterus enlarged & grown Scirrhous. They have no immediate tendency to Cancer, yet if they grow fast, they generally destroy the Patient by pressing the neighbouring parts

parts & bringing on ill health, — they generally happen to young Wom:
:en — If we put the Hand on the belly immediately after Delivery, we
sometimes feel such Tumors in the Uterus pretty distinctly — If the
Woman should conceive these Tumors are grown large, the Uterus
is irritated is so much that She always miscarries

The Cancer of the Uterus is a very common disease — It is commonly
preceded by bad Uterine Irritation, Irregular menses, Fluor Albus, Pains
&c — And during the time of Menstruation great quantities of blood
(clotted blood) come away, the Strength fails with loss of Appetite & the
colour changes to what the Ancients called Atrabilious — The first
stage may be called Scirrhous, for the Uterus enlarges very much, &
grows very hard, as it proceeds the Fluor Albus grows very Offensive,
the Cancer Ulcerates, & the discharge is intolerably offensive — Oftentimes
the Bladder & Rectum are eaten thro' from the Vagina or Uterus, & the
Disease increases untill Death affords wellcome relief to the miser:
:rable Patient — For this disorder the Cicuta, as in other Cancers, somet:
:imes affords a little temporary Ease, but never perfects a Cure —

Polypi of the Uterus are of different consistences, hard & soft, No
medicine will remove them, they sometimes will drop off of themselves,
When they grow large, they bleed much, so as to weaken the Woman &
bring on Dropsy, & Death — If they are tied, the Draining of Blood
ceases immediately, the Woman regains her strength, & gets well
presently — If possible therefore they should be tied, & if no part of the
Uterus or Vagina is inclosed in the Ligature, as high up to the root as
we can — Dr Hunter once tied one, & contrary to his expectations it gave
the Woman pain at the time, : mortification came on the external and
internal parts, & she died in a few days — Upon opening the body he
found

Diseases of Women

found that a bit of the Uterus was tied instead of the Polypus, for the Polypus had dragged the Fundus Uteri down thro the Os Tincæ, which it had dilated by it's bulk, so that it laid in the Vagina as the root of the Polypus — The tying the Uterus was what gave the pain, we should prepare for tying, then pull gently & if it gives any pain we must leave off, for probably we shall have included a part of the Uterus, or of the Vagina; if it gives no pain we may venture to pull a little more & so on more & more, & if it gives no pain at all, we may tie it tight, & be assured that all is right — After it is tied it shrivels up for want of a supply of Juices, & drops off; & when the Ligature comes away tho the Polypus remains, we may be certain that it does not adhere to any part of the Uterus, & we may Extract it how we can — Monsieur Leverett ties it with a piece of Wire, but a strong thread is better —

The Water of the Dropsy of the Ovarium, is sometimes in One, some:times in a number of Cysts — Sometimes the Contents of the Cysts are Jelly — The Operation of cutting out the Dropsical Ovarium proposed by the French Surgeons is not practicable, for it don't adhere by a small Basis, but is united to the neighbouring parts —

Pregnancy Lect 95 The Woman

Pregnancy

Lecture 95th

The Woman whose Relations have had many Children who is healthy & who menstruates regularly is most likely to bear Children, & therefore should be chosen by the Man who wishes to have Children. It is a common opinion that a Woman cannot be with Child till She has once menstruated either for the first time or since the delivery of a former Child, but this is a mistake. A Woman who lives quietly & with her affections confined to one Man is most likely to be with Child and to go her full time, and for this reason it seems to be, that the Wives of Clergymen have so many Children. The most certain sign of Pregnancy is obstructed menses, and if little shews happen now & then for a month after obstruction & every day for instance, we may be pretty sure that She is with Child. another sign is sickness at ye Stomach, commonly in the morning when She gets up; if she were to lie in bed all day she would not be sick in the least; these two are the chief marks of Pregnancy. There are many others of less consequence; many Women become heated & dry & are costive. many have heart-burn & Colicky Complaints, & many feel their Breasts unusually filled & sometimes painfull. In the third, but especially in the fourth month the Case becomes more plain, the obstruction of the menses continues, the sickness is either gone off gradually, or is lessened, and the Areola round the nipple enlarges and changes to a darker colour: about this time they quicken and increase in Bulk, as the Stays open behind something warm should lie upon the Back, there to defend it from Cold. In common the Sickness does not come on till the end of the first month & by this month is gone. The motion within the belly as if the Child moved is very uncertain, it comes on generally

Pregnancy

generally however at 12, or 13 Weeks, & increases as the Child grows stronger but some Women never feel it at all — We cannot tell precisely whether a Woman is with Child unless by examining her, and even not then unless we are much experienced — It is more difficult to tell it in early Pregnancy, and we may be deceived by the substance of the Uterus being enlarged into a Tumor, but generally speaking if a Woman is pregnant we shall feel the Uterus about the Orifice softer & more spongy than it is when unimpregnated — When she is not very big, we can gen:erally move the tumid Uterus from side to side by our hands upon her Belly as it increases it becomes fixed — We should rather put off Exam:ination as far as possible, that we may be enabled to determine more readily & certainly, without submitting the Woman to this disagreeable circ:umstance again — The Time of Reckoning is, one may say, always the same, & always has been the same — the time of Labour is Nine Calendar Months — the exact time of Conception is very uncertain, as it may happen on any day of the Interval between the last day of the menses leaving, and the day they are missed, — But the safest way is to reckon from the last day of Menstruation, for then the Woman will be prepared should it happen sooner, — Dr Hunter thinks that a Woman may go a little more than 10 months, but that no One can go farther — This however is nothing surprizing, for Cows very often Stay a fortnight or a Month, & Ld. Pembroke had a mare which went 13 months — Sometimes a Child is born at 8 months, and a Woman is more apt to come at 8 months of her first Child, than afterwards — It was an Opinion with Hippocrates that a 7 months Child was more likely to live than an 8 months Child, reasoning from the Old Doctrine of odd numbers, but certainly it is the reverse — they hardly ever live when born at less than 8 months — The general management of a pregnant Woman is to let

Pregnancy

to let her live nearly as at another time, to avoid all fatigue, & this last should be observed in our Medicinal treatment for any complaint. If she gets too full & is heated, we should take away 3 or 4 ounces of blood, & a little of any gentle Laxative should be taken for the usual costiveness which is apt to bring on the Piles. A Woman may miscarry at any time in the 9 months, but generally does at 3 months. The miscarriage is always to be left to itself for the flooding will bring on fainting & the fainting will stop it. Women likely to miscarry should be put upon the proper plans how to proceed. Immediately after the first Ceasing of the menses, we should attend to the general health; if relaxed give Bark, order the Cold Bath &c. The greatest number of miscarriages will be found to happen in relaxed & nervous Habits. When the Flooding is very violent, Vinegar & other Astringents are commonly applied to the Loins & Os Sacrum, & supposed to be of Service, but it almost always stops of itself. The Woman is generally left very much reduced, but she soon gains strength again, & whenever a Woman seems to die from flooding she will be found to have died from some other weakness of Constitution unless in the latter months of Pregnancy. A common accident in Pregn:ancy is the Retroversion of the Uterus, the Fundus turns down into the hollow of the Os Sacrum, & the neck of the Bladder being compressed there is a stoppage of Urine, which is sometimes fatal, & the Faeces are obstructed in consequence of the Rectum being pressed upon. If taken in time, the Woman may be saved. We must draw off the Urine, empty the Bowels by a Clyster, & then put the Woman into such an attitude as to make the Shoulders depending, & the Hips high, introduce a finger into the Vagina & another into the Rectum, & endeavour to work up the Fundus by degrees, & if we are so lucky as to get it right again, she must be laid down carefully so that it may not go back again. The

woman

Retroversion of the Uterus

Woman should be kept quiet in bed for some time. If the Case is so bad that we cannot get it up again, nor draw off the Urine, & the Woman is in danger of dying from the Suppression, it might be perhaps advis:=eable to thrust a Trocar from the Vagina into the Uterus to draw off the Liquor Amnii, and produce Miscarriage. —

Labour

A natural Labour is generally best left to itself. A Woman commonly falls into Labour, when her Reckoning is up. The Pains do not begin in the Uterus, but in the Back, Hips, Thighs, & Region of the Uterus. They come and then go off again, & every succeeding time they return at shorter Intervals. There is a discharge from the Uterus, which is a mixture of Blood, & the loosened Jelly, that stopped up the Orifice. And when we see this discharge, there is hardly any doubt of the Woman being in Labour. The Membranes commonly do not break till the Pains have continued a considerable time, & just before the Child is born. Sometimes the Pains are such as to be mistaken for the Colick. If an opening of the Belly ensues, it is better, as it will make room for the Child to pass down, & indeed we should always give a Glyster if she has not lately had a Stool. The time of Labour is very different, as it is the first, or another Child, for the first Labour is more difficult and longer, especially in a Woman advanced in Life, for then the parts are not so yielding. In common it does not last more than 12 hours, somet:=imes 24, & sometimes more. And there seems to be something periodic:=al in Labour, happening commonly at the distance of 12 or 24 hours after the first Attack of the pains. If the Child lies right & every thing goes on well, the less we do the better, unless when the Child is going to be born.

It is

Labour

It is a bad method to use any Cordial in the time of Labour, we should only give something cooling, as a Bason of Water Gruel without wine, or any other such Liquor, for we must prevent heat & fever, which will certainly do harm. And to hinder the Woman's growing uneasy on account of her being in pain, & not yet delivered, we must tell her, she is not in Labour, but that her pains are something like it. The grinding Pains do nothing, but when the forcing pains come on the Os Tincæ dilates, the parts stretch, & the Delivery is at hand, & then we may assist. We can further the Dilatation of the Os Tincæ with our Finger. If the membranes are not broken, & there is no flooding, we should do nothing, if the membranes have been broken for some time, or if there is a flooding, we should then exam:ine to know the state of things & how to expedite the Labour, for if anything is unnatural, as the Child not presenting right, we have only occasion to turn it, & the sooner this is done the better, that is, before the Uterus is contracted. When we examine the Woman sho:uld be in bed lying on her left side with her body bent, her knees bent, & her back turned towards us. In this posture we can more easily examine with the finger of our right hand, & examining from behind will give the Woman less Offence than examining before. When we find that the Orifice of the Womb is sufficiently opened, and the Child ready to pass down, we should order the Woman to bed, for if she is put to bed sooner, she tumbles the bed in her pains, and grows tired of it, and uneasy.

Labour

Lecture 96th

In a Natural Labour we should do nothing, but direct how it may be gone thro' with Decency, & so that the Bed may be kept clean — The Water & other Discharges must be kept soaked up from time to time with Cloths — The Woman always complains of violent pain in her Back, & finds great relief from pressure, with the hand or rubbing the Back, & this should be done — A finger or two may be introduced to keep the passage of the Child when it is coming down, by opening the fingers the lower parts may be opened, which will rouse a pain, & promote the birth — this thing may be done when there is any little difficulty of the Child's coming thro' the Vagina, otherwise we should rather seem to assist, than do any thing in reality — when the Child is going to be born, just when the Head is coming down, the upper Leg should be kept from the Other, & we should keep the Knees asunder by a large pillow rolled up hard, and placed between them to give room — We must endeavour to persuade the Woman not to bear down too forcibly for fear of the Child's Head tearing the Perinæum, which is more likely to happen in the first Labour, & as the Head is coming out we should support the Perinæum — When the Head is delivered all the danger is over, but we would not chuse to leave the Child so, & therefore we must assist the Pains by pulling gently & passing the finger up to clear the Shoulders from the Uterus that is now contracting on the Neck, the Child naturally first comes down with its face directly backwards, then as it comes farther down it turns so that One Shoulder is directly backwards, which perhaps may lacerate the Perinæum if we do not support it, or an Elbow or an hand may do it

by getting

by getting into an awkward situation, - When the Child is born we tye the Navel String then stripe the String to get the blood up, & cut it off a little above the Ligature, & wrap the end next the Placenta in a Cloth, to keep the Bed clean, & the Child should be put into a Flannel reciever - We should now feel the Abdomen to know whether there is another Child or not, & at the same time we may press down the flaccid Uterus, then we should tuck in the Bed Cloaths, so as to gird the Abdomen, which will assist in keeping off the faintness that is apt to happen when the pressure is taken off from the Abdomen, & it will help the contraction of the Uterus in some measure, & thereby the Expulsion of the Placenta - If the Placenta dont come away readily we may assist it by pulling the String gently, & steadily, but the less we do the better provided all is safe - If the Grinding pains come on, it is a sign that the Placenta will soon come away; If we pull at all we should pull downwards so as to avoid the Symphysis of the Pubis; Sometimes the Orifice of the Uterus is contracted & prevents its coming down, here we may assist by dilating the Orifice with the fingers - By pulling very gently, we can generally peel away the Placenta & the Membranes uniformly & all may be brought away together - When all is over we should roll up the Sheets laid on the Bed to confine the wet & every thing else & draw them away, for if we draw them away without first rolling them up, we shall throw the Clots of Blood into the Bed, & then when all is taken away warm Cloths must be applied below to imbibe the discharges & keep the Bed dry, a very little Cordial should be given least the Woman should be inclined to heat, & fever - In time of Labour a Woman is apt to vomit, but seldom

seldom to purge, so that we should be constantly prepared, for the Occasion is always sudden. Some are apt to shiver, but this is of no consequence. Cramps are sometimes very perplexing but never do any Mischief. If there is considerable faintness then something a little Cordial must be allowed. After Delivery the common Accidents are Fainting & Flooding. Fainting is not of much Consequence unless it is occasioned by violent Flooding. The after pains are occasioned by the Contraction of the Uterus, & after a considerable after pain there is a large Gush of Blood Clotted, for the Clotted Blood is thereby forced off from the ends of the divided Arteries & Veins. When the Floodings are in the natural way we should do nothing, but if they are very Violent, we should give an Opiate. The great Floodings used to be owing to the injudicious method of bringing away the Placenta & Membranes. We can introduce the hand, and by getting on their out side, we may peel off the Membranes & Placenta, but this should not be done unless the violent flooding makes it absolutely necessary, for the introduction of the hand so high up into the Belly even to the Scrobiculus Cordis (for the flaccid Uterus flies before the hand) hurts the Woman exceedingly, & the Arm does so much Injury to the Bladder that She ever after finds the inconveniency of it. Generally the Placenta will come away of itself in a few hours, sometimes it remains a day or two, sometimes a part only seperates, & the Case being sluggish there is danger from the Flooding. Then we must get the Placenta away as soon as we can. If an hour after delivery there is no sign of its coming away, we should pass the hand up to forward its seperation. In difficult Labours, we are to do exactly as in the Natural Labour, only we must

endeavour

endeavour especially to keep up the Spirits – they who have Severe Labours never have a Fever after it. – If the Woman is advanced in Life & the parts are so rigid that they do not stretch, if we shove the mouth of the Uterus up over the Child's head, it will come down into the Vagina very well – If the Child's head is large or if the Pelvis is narrow, the Bones of the Skull will naturally give way at the Sutures, & slip over each other, & thus the head will adapt itself in form to the Pelvis, & come down – If we were to attempt this Ourselves, the sudden Alteration which we necessarily produce will kill the Child, the gradual natural Alteration never does any harm, so that we should wait with patience, & we shall be surprized to see what great things Nature will accomplish – The natural & most common position is with the head downwards, & face backwards – If the head comes down with the face forwards, some advise us to turn it to the natural position, but it should be left to come as it is, & Care should be taken to support the Perinaeum against the great press: :ure that the hind head will make as it comes down – If the head is bent backwards so that the face presents, it lies very badly, nevertheless it is better to let it come as it is, for whatever we do does considerable Inju: :ry to the Mother, especially if we use Instruments – We should not endeavour to turn the Child & deliver by the feet, as is directed in this case. The best Rule is when the Head presents to let the head come as it will – Sometimes the Breast presents either with One or both feet downwards – If the feet come down, we must deliver by the feet, if the Breast alone presents, we must let it take its own way as it is – It is best always when We can to avoid delivering by the feet, espec: if the head sh.d happen to be a large One, for as the head will come out last, & as the Navel String comes into the World before it, it will be compressed by the head, & if the head sh.d remain for some time in this position, it will compress the String so long against the sides of the Pelvis as to kill the Child, by stopping the Circulation, & this seems to be a common cause of the Death of Infants – It is better to let the Child come down by the Breast, for the passage will

be so

be so dilated by Nature as to let all pass readily & safely, & if we are Obliged to deliver by the feet at any time, it is better to wait till the passage is sufficiently dilated of itself before we attempt delivery at all. The other positions mentioned in Authors are probably without foundation, as when the Back or the Belly, or one side, or an Arm, or a Leg present, Dr Hunter says, he never saw one of these. If a hand lies on the head as it presents, we should push it up by carrying the Arm round on the proper side close to the body, & in doing this we must take the Opportunity of a Relaxation. Sometimes the Navel String comes down immediately upon the breaking of the Waters, & so it is in the World before the Child. This is a dangerous case for the head as it comes down will compress the String & probably occasion Death. We must endeavour at the time of Relaxation to slip it up either with the finger, or the handle of a Spoon &c, but this will be difficult on account of the slipperiness of the parts, for when we have got it almost up it will return down again perhaps. If we cannot get it up, we are directed to turn the Child & deliver by the Feet, but we should rather let it take its chance as it is, for if we turn it, the head will necessarily be the last to come out, & then the Force used to draw it out will be sufficient to kill the Child independ: of the Compression, more especially if the head be large or the Pelvis a narrow one. & the Mother always runs some risk from turning the Child, for the Uterus is injured by it, or perhaps ruptured, which last once happened to Dr Hunter. In some cases we must turn the Child, but it must be done with extreme great caution, & if a Forcing pain comes on we should lie by till the pain is over, & then proceed. Dr Smellie directed it to be done by thrusting up the head & in the time of a pain too, in quest of the Feet & lay hold of them & draw 'em down. But in the time of a pain the Uterus contracting & being pressed on very forcibly by the Abdominal Muscles, we shall stand a chance of rupturing the Uterus, especially if we use the same force that is commonly used on these Occasions. Very little force need & therefore should be used, we should gradually introduce the hand at the time of Relaxation, & if a pain comes on we should keep our ground

ground & lie by, when the pain is gone off we may go higher & so proceed without any regard to the head or lower parts of the Child till we get pretty high up, then we must feel for the feet, & examine how they are situated with respect to the body, & get both if possible — If a pain should come on we must lie still & not quit our hold; by gently pulling by the feet the other parts of the Child will follow round, & a very small degree of force will turn it. — If the Flooding continues with Violence (for it is for flooding that the Child should be turned) we must go on gently pulling in the direction of the Pelvis, & when the Legs are pretty low down we must feel for the Arms & get them down by turning them forwards & close upon the sides of the body. — If it is the first Child, or if the Woman has a narrow Pelvis, so that we imagine she can't be delivered nat: :urally in a very little time, we must Deliver her by turning the Child gently, as well as pull down. — When it is born we must attend to it immediately to see if it is Alive, & if there is any possibility of recovering it tho' it has no pulse, we should use some Stimulus, a very warm Cloth should be applied all over the Stomach, perhaps the Child may upon this give one Sob, & for want of some Stimulus to excite Respiration, it may not inspire again, we should therefore put a little Hartshorn upon the Nose & Lips, so that it may be drawn in by the Sob, which will irritate the Lungs & excite them to Respiration, and then the Child will recover, but if nothing of this kind is used, the Child hardly ever gives a Second Sob. — It is a common thing to blow into the Mouth, & so into the Lungs, but it is always ineffectual. — Every thing should be done gradually & softly in Midwifery, & if the Child's head should lodge on the Os Pubis, we must free it, & alway take Care to support the Perinaeum against the pressure of the head, or any other part that presses it ——

Labour ...

Labour

Lecture 97th

There are two Cases which are very alarming, viz Flooding & Convulsions Flooding is commonly owing to a Seperation of the Placenta & membranes from the Uterus, & therefore a Woman often sets out in Labour with a pretty smart flooding, which however abates, We should keep her Cool, that the Flooding may not be Incouraged & the Labour pains will generally come on in a little time & Delivery soon follow. If the Placenta grows over the mouth of the Uterus, the Case is the worse, because the pressure from above cannot dilate the Orifice, but as the Orifice grows loose, the Placenta separates there, & the divided Vessels will afford a plentiful flooding which must continue untill the Woman is delivered, & the Uterus has room to contract & stop it, & as the Placenta hinders the pressure from dilating the Orifice, of Course it prevents Delivery. In this Case, we must thrust our hand thro' the mass of Placenta & break the membra: :nes so that the Child may be born, if there is a Relaxation at the Orifice of the Uterus. If the Woman has sufficient strength to set up the pain & exclude the Child of herself we may do nothing farther, but if She is too low from the flooding, we must deliver her without 6 Delay, for untill she is delivered the Flooding will not stop, & generally speaking, after we have delivered her, she will die from the great Loss of Blood which must necessarily follow

Convulsions are very dreadfull, Sometimes they happen in preg: :nancy, & sometimes in Labour. In the first Fit, there commonly happens a little something to the Brain, so that she does not recover her Senses perfectly sometimes for a day or two. There is a succession of Fits & they leave the Senses worse every time & after entirely ceasing they often leave the

the disturbance in the senses for a Month — The Woman may die of the Fits without ever being in Labour — This Complaint not only happens to Women who have had Fits before in their Life time, but to those also who never have, so that it seems to be owing to a Cause connected with Breeding, and appears to arise from some irritation upon the Nervous System — In Labour it is a common thing to say, that these Fits are the Death of the Child, but this is without foundation for we see living Children born as often after them as when there have been none. — In general in these Fits the Face becomes very full of blood, and tho' there seems to be a great Derivation of it to the Head, yet upon examining the Brain after Death it always appears perfectly sound & in a natural state — they happen to Women who are full, & not to those who are empty, but it is right to take away a pretty considerable quantity of Blood if the Woman can bear it, lest fullness should occasion it, and this perhaps may prevent a return — an opiate too seems to have some Effect in moderating them — Sometimes they are preceded by a smart head Ach or pain shooting from the pit of the Stomach thro' the back, at other times there is no warning at all — When the Labour comes on in these Cases we should endeavour to break the Waters to prevent the Distension of the Uterus from producing Irritation upon the Nerves, which possibly it might do so as to increase the Tendency to these Fits — When she is delivered, the Case must be left to Nature, and generally speaking there is never a return after Delivery; but we may give an opiate to quiet her a little — There hardly ever happens a Case, in which the Forceps are of Service — They

must not

must never be used till the Child's Head is got down into the Cavity of the Pelvis, for we never should attempt to get them up into the Uterus, as some do - We can only use them when the Child's Head pres: :ents, and they serve the use of hands, when we cannot get our hands on the side of the head - We should pull with them at the time of a Pain, & till then they should not be closed upon the Head - We must be exceedingly cautious in using them, otherwise they will hurt the head, and the Mother, so much as to endanger both - A Case favourable for the Forceps is a painfull Long Labour, & tho' there remains but little to be done, yet the Woman is too weak & low to do it - Now we can finish it easily & expeditiously by drawing the head gently down - If the Woman is already very weak from flooding, which is continuing still tho' the head is very low down, we must have recourse to this Operation - we must introduce first one blade, where there is room, & work it over the Ear, or Temple if we cant get it over the Ear, & then do the same with the Other blade, then when a pain comes on, we must pull gently, for the pain will act in Concert with our Effort, to bring the head down - When we have got the head pretty low, if there is strength left to produce a sufficient pain, we should let the Child into the World; we must pull to the last, but in this as in every other Case we must take Care to avoid a rupture of the Perinaeum, & therefore we should pull the head forwards from the Perinaeum - It is sometimes necessary to open the Child's head, and deliver by the Crotchet - We should never have recourse to this, unless where we see, that the Mother will die in all human probability, as well as the Child, provided

we do

Labour

We do not save her at the Expence of the Child; for the Pelvis is someti:
:mes so narrow, or the head so very large, that it is impossible, that it should come down into the Cavity of the Pelvis. It should never be done, but as the Result of a Consultation, for we might thro' fatigue on our side determine upon it, when the Case is not so dangerous, but that the Child may be born alive, if we wait with Patience. The best way of opening the head, is to do it with the proper Scissars, & if possible by thrusting them in at a Suture, after having made a sufficient opening by turning them round & opening them a little, we must introduce the hook of the Crotchett, & turn it round & round within the Skull to break the Brain all over & by catching the Pia mater we can draw it out with the hook & a great part of the Brain along with it. All this should be done with Caution, the fingers should be just put up to feel the Situation of the head & Sutures, & to guide the point of the Scissars, & we should open the Scissars so that none of the Uterus may get between the Blades. The head being emptied as it were of its Contents, the pains will in five or six hours shove the Bones over one another, so that the Head will have its Bulk diminished & descend: Or we may fix the hook of the Crotchett on the inside of the Bone, & with the fingers of the other hand opposite to it on the other side of the bone pull gently to bring the head down, for the hook generally comes on thro' the bone & sometimes tears quite out, so that the fingers will be usefull to prevent its hurting the Uterus. When there are Twins, they commonly come, one with the head presenting, the other with the feet & Breech. After one is

Labour

One is born, if no second pains come on of the pressing kind in an hour or two, we should break the Waters, & then the Child will come away. A Dead Child is born in the same manner as a living One, & requires no difference in practice. We should not think of doing any thing because we are sure of doing no mischief to the Child, for whatever we do is dangerous to the Mother. The most dreadfull Case of all is the Rupture of the Uterus. It is an Accident that sometimes happens of itself, & sometimes from the Arts used in Delivery; there it signifies nothing what we do, for the Woman must die. The Child can only be taken out of the Abdomen either by the hand introduced into the Uterus, & thrust thro' the Laceration into the Abdomen, or by cutting it out of the Abdomen. But do it which way we will, we shall find all Circulation to have ceased thro' the Navel String & the Child dead. It is better therefore to leave the Case to itself, untill God pleases to relieve the Woman. In Labour it shall happen that all of a sudden in a violent pain the Woman shall feel something give way, and upon examination, we cant find any Child in the Uterus, but upon carrying the hand round, we feel a Laceration, & thro' that we feel the Intestines, & perhaps the Child. This Accident once happened to Dr Hunter, while he was turning the Child, it suddenly slipt away from him thro' the Lacerated Uterus, & got out of reach. When the Placenta does not come away immediately, we should never use much force for fear of pulling the Fundus Uteri down, & inverting it. This Inversion will sometimes happen naturally, for the mass of Placenta may be thrust down by the Efforts, & instead of separating from, will bring down the Fundus along with it. In both Cases there will be a large Mass or

Tumour

Labour

1 Turned out at the Vulva, the lower part made by the Placenta, and the upper part by the Fundus, — We must separate the Placenta, and membranes off from the Uterus, and carry the Fundus up with the hand so high into the Abdomen as to place it in it's natural Situation lest any part of it should remain inverted — It should always be done as soon as possible, for when the Uterus is contracted, and got thick & hard, it will be more difficult if not quite impracticable when the Fundus remains inverted, it commonly kills the Woman, in the Space of a few months or a year, there is such a continual Draining of blood from the Inverted part ———

The Case of an Extra: Uterine Fœtus cannot be assisted; it must always be left to itself — If an Abscess should form & the Bones come away, we would naturally dilate the Opening to make way for the discharge of the rest, — The Woman who has one of these dead Extra: Uterine Fœtuses within her may breed again in the mean time ———

Treatment after Birth

Lecture 98th

Of the Mother

We should watch her very carefully, & if She is well at the end of five days, She runs but little risk. Generally speaking the After=Pains come on soon after Birth, but they seldom come on at all after the first Child. They seem to be the Effect of the Contraction of the Uterus to drive off the Coagulated Blood. We should do nothing for them, except indeed when they are very violent, we may give an opiate. Laceration of the Perinæum is of no consequence unless the Rectum is torn, for if that is torn there is always an incontinence of Fæces remaining. Stitches in this Case are of no service, as they never hold, for Lacerated flesh will always suppurate, so that do what we will, the Vulva & Anus will be always laid into One. The Rupture of the Bladder never heals up, but remains open into the Vagina, which is continually irritated by the constant dribbling of the Urine thro' the Opening. The Bladder will suppurate from time to time, & will remain fistulous. If there is any Gravel in the Bladder, the Child in pressing down will bring the Bladder against it by pressing them against the Os Pubis, so that it will suppurate, and become fistulous by this means. In this Case likewise we can be of no Service. The great thing of all independant of the Accidents of Labour is the Child bed Fever. It commonly comes on before the time of the coming on of the Milk, & when it is attended with excruciating pains in the Head & Limbs it is very dangerous. It does not happen from the Delivery, for those that have severe Labours never have it. The Woman must be kept warm, & the body kept open, & in 24 hours it will generally go off of itself. Any thing Else that we can do will be of

be of no Service; The Belly & Breasts will swell, but the Swelling will go away of itself — It is not the Nature of the Fever, but the Nature of the Constitution that can't bear fever at this time which kills — women are liable to Hemiplegia at this time, but it is not owing to the Milk falling on particular parts as has been considered — Some are attacked with Madness — the generality of these Cases do well of themselves — The Inflammation & Swelling of the Thigh & Leg do well with Bleeding & an Antiphlogistic Regimen — If Other Complaints happen at this time, they must be treated as in common, as for instance, if there is an Ague, we must give Bark —

Of the Child

We should attend to the first Stools & Urine, & if none come owing to Imperforation, we must make a passage — If there is no Gut going down into the Pelvis, the Case is irremediable, & Death will soon ensue, for we can do nothing — A few hours after Birth, a Child's Head is apt to swell up into a Tumor — It is an Extravasation of Blood, but it never should be opened, for it always goes away itself — The Jaundice that a Child is liable to requires nothing to be done for it — The little Breasts of the Child are apt to inflame & swell, but they never suppurate, they always get well of themselves or with a little poultice, & when getting well a thick white substance may be squeezed out of the Nipples — The Red Gum requires nothing nor does the Thrush more than keeping the Mouth clean, for if we take it off it grows again, but it will of itself gradually get well, & when it is going away there come little Eruptions about the Arms, which Nurses call the Thrush going thro' the body — Children are very

Of the Child

are very liable to Sore Eyes, but this requires nothing than keeping them washed clean — If it arises from the Mother having a Gonorrhea then Mercurials must be given — Gripes & Fits require hardly any thing, but Rhubarb or Magnesia to keep the primæ Viæ clear — It is a good way to inoculate the Child at the Breast while it is very young before the time of Teething — At the time of Teething it should not be ventured on — the Scabby Skin is a Symptom of the Teething & leaves the Child gradually as it grows up — It is best to bring the Child up by the Breast, & the Woman that suckles it should not, if we can chuse, menstruate while She gives Suck — The Rickets are to be treated by Cold Bathing — The Method of managing the Club Foot is to roll it in its proper position — When there are a Number of Twines of the Intestines out in the Navel String, they cannot be returned by an Operation similar to that of the Strangulated Hernia, for they adhere to the inside of the String — Sometimes the Placenta degenerates into a Mass of Hydatids, but we now & then see Hydatids come away when a Woman has never conceived —

On Embalming

Lecture 99th

Being Supplement to 81st Lecture

After the Death of an Animal the body soon becomes putrid, and is in time totally dissolved by Putrefaction. It has been said that the Agyptians when they embalm dead bodies, pick out the Brain thro' the Nose with an Hook, but this seems too Absurd. A Mummy brought from abroad, and lately carried to the Museum at Cambridge, which the Dr saw, appeared much as if it had been dryed in the Wind in Cold Weather next to the Freezing point. In Lydia they prepare them by burying them in the Hot Sand, & which the Dr tho' he never has, intends to try by keeping a Limb in Warmed Sand. From the Dissection of an Agyptian Mummy belonging to the Royal Society, it appeared before Dr Hunter, his Bro. & others, not to be an human body; it is true, there were the Bones, but they were cover'd with Linnen dipt in Tar, which by Compression was made in Shape like an human body, & it was evident there was not any Muscular Flesh.

To Embalm a body properly, you must first get rid of the

On Embalming

of the Animal Juices, and when the flesh is dry, it must be impregnated with Something that will resist putrefaction — You should always take Care, when you intend to Embalm a body, to have the following things ready, Viz. Ol. Terebinth. ℔ij Terebinth Venet ℥4 or ℥6 — Vermillion ℥x. Spt Vin Rect cu Camph ℔iij or more Rosin ℔x. Nitre ℔ij. Camphor ℔4, these three last should be powdered & mixt — Ol Rosmarin ℔j, Ol Chamam ℥ij Ol Lavend ℥aj, and Paris Plaister about 140, a Bag of which weighing 14 costs 1.6 — As soon after the Body is dead as it is decent, or as soon as you can prevail on the Friends, is the time for Embalming & always before Putrefaction begins — Every Subject that is capable of recovery after drowning &c Dr Hunter thinks, have their Limbs flexable, & that as Rigidity is a certain sign of Death, you ought always to wait for that — To begin, you should dissect down to the Inguinal Artery midway between the Anterior Superior part of the Spine of the Os Ilium & the Symphysis of the Os Pubis — and inject into it Ol Terebinth with Terebinth Venet & Vermillion (first squeezing

squeezing out a little of the Blood) and keep continually syringing till you have filled the body, or till it be all over of a reddish hue — Having thus resisted putrefaction you should let it remain twelve hours or more, after which you are to open the body in the usual manner & take out all the Viscera of the Thorax & Abdomen — Cut thro' the Aorta, the Vena Cava, or the two Subclavians & the Trachea — but leave the Extremity of the Aorta at any rate & the Contents of the Pelvis — make an Aperture in the Small Intestines about the Jejunum & squeeze out the Contents of the Stomach, Duodenum, &c into it & tye up the Orifice — Squeeze all the different Viscera well & dry them with dry Cloths — Empty the Bladder & Rectum, and take out the Kidnies — you should employ a full hour in getting out the Blood & moisture from the body by stroking it beginning at the head & so going to the Extremities, — as the Brain will be well defended from Air you may leave that in — then inject the Ascending Aorta tying up the Descending Aorta, & also tye up the two mam:-illary Arteries — Inject with the first Syringe Ol Terebinth & after that strong Spirits of Wine & Camphor; this being done inject ye Descending Aorta tying the Epigastric Arteries first

On Embalming

First with Ol Terebinth & then strong Spts of Wine & Camphor; then inject the Heart, Lungs, & rest of the Viscera with Ol Terebinth & Spts of Wine & Camphor — Put a pipe into the Superior Mesenteric Artery & tye the Inferior Mesenteric & Cæliac & by injecting as before you fill the Viscera of the abdomen — the Kidnies are to be injected by the Emulgents — aromatic Herbs in the body are of no Service, as Dr Hunter thinks, Vegetable Substances do not resist putrefaction — the Cavities are to be stopt with the Powder, viz, Resin, Nitre & Camphor, as the Nitre mixes with ye water & resists putrefaction — you are to strew some of the Powder into the Trunk & then put a Stratum of Viscera & so on, continually putting the Powder between every part — Having thus nearly filled the body, you are to sew it up neatly beginning at the Neck & when you come to the Navel to pour in a Bottle of Spts of Wine & Camphor upon ye Powder & after that to put in Some Essential Oil, then more Powder & sew ye body completely up — Rub ye Mouth & Nose with Sponge wet in Ol Terebinth & Spt of Wine & Camphor, & pour some down the Trachea & Oesophagus, & then stuff up the Mouth & Nose with Powder & afterwards put in some Essential Oil; then do the Ears in the same manner — Take out the humours of the Eyes by cutting in at the upper part of the Eye & then squeezing out the humours —

On Embalming

humours, fill the Balls with Powder, & then put in Some Essential Oil — Then lay the body on a dry Table & make it very clean & dry on the outside & rubb it over well with Spt. of wine & Camphor & afterwards with Essential Oil — make a Bed of fresh baked, well dryed Paris Plaister in a Box or Coffin & put the Body in it — then add Paris Plaister sufficient to half cover the body — you should take Care to keep out the External Air & have a Glass over it, that you may see how it goes on — Many Small Bottles of Essential Oil are to be stuck in the Paris Plaister — the Expence of the Above mentioned Process besides Box &c is about £10, or £12, which is exactly the Manner in which Mrs Vanbutchell was Embalmed Jan. 15th 1775, whose body kept moist (except just the face) for many months, but is now perfectly dry & free from Any Tendency to Putrefaction, in which state Dr Hunter doubts not, but She may remain for 500 Years — Mrs Vanbutchell lies in a Mahogany Glass Case, & has been seen by a great Number of People —

Finis

No. 14 Jan 1776

ANATOMY

By Dr. Hunter.

Mr W. T. Mercier